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DISEASES CAUSED BY BACTERIA AND FUNGI.

BONTEMS. (1931). La lutte contre la gourme épidémique dans les établissements de Remonte. [**The Fight against Epidemic Strangles in Remount Depôts**]. —*Rev. vét. et J. Méd. vét.* **83.** 537-543.

The author regrets that little progress is made against epidemic strangles in Remount Depôts. He reviews various methods of treatment and suggests that the reason why certain cases do not respond to serum treatment is possibly because the causal streptococci may be of varying antigenic types. For the same reason, probably, no abatement of the condition is caused by the injection into young affected horses of massive doses of citrated blood from old horses which do not suffer from strangles although they are in constant contact with this disease.

Non-specific therapy, both general and local, is also discussed. The author proposes to try the effect of treatment with the sera of horses convalescent from strangles.

R. LOVELL.

BORDET, P. (1931). Morphologie du Pneumocoque. [**Morphology of the Pneumococcus**].—*C.R. Soc. Biol. Paris.* **108.** 707-709.

BORDET, P. (1931). Propriétés biochemiques du Pneumocoque en rapport avec l'immunité. [**Biochemical Properties of the Pneumococcus in Connection with Immunity**].—*Ibid.* 752-754. [1 ref.]

In contrast to those in guinea pig or mouse serum, 24 hour cultures of the pneumococcus in rabbit serum, when stained with a mixture of Borrel's blue and eosin (Laveran's method), show not only diplococci which are stained blue but masses of rounded granular bodies which are red and vary in size from less than that of a coccus to 2 or 3 μ. They can appear in media containing 10 per cent. serum, though later; but not in ordinary media. Heating the serum to 56° C. for half an hour prevents their formation, but heating at 50° C. for the same time is without effect. The three types I, II and III, are equally apt to produce these bodies and the serum of an animal vaccinated against one type is unsuited to their production not only by that type, but also by the others.

In serum antiserum mixtures the retarding effect, already appreciable with 10 per cent. of antiserum, is marked when 25 per cent. is used.

In the second communication it is shown that all types of pneumococci when grown in rabbit or mouse serum carry the pH to about 6·2. Cultures in guinea pig serum remain neutral or nearly so, and for this animal the pneumococcus shows a much lower degree of virulence. When grown in the serum of a vaccinated animal this depression of pH does not occur. Cultures of types I, II or III are similarly inhibited by a serum produced with either. Heating to 65° C. does not destroy the effect and serial cultures in antiserum behave in a similar manner. The production of a low pH and of the bodies described in the first communication is not necessarily concomitant.

A. W. STABLEFORTH.

WADSWORTH, A., & GUIGLEY, J. J. (1931). **Studies on the Bacterial Toxins. Concentration and Purification of the Toxin of** *Streptococcus hæmolyticus* **with Acetone.**—*J. Immunol.* **20.** 459-462. 1 table. [10 refs.]

A four to seven days' broth culture of the streptococcus is filtered and 1,000 c.c. of acetone is added to 500 c.c. of toxic filtrate, both reagents first being cooled to about 4° C. A precipitate forms and after standing and decanting of the acetone has been carried out, the precipitate is dissolved in a small amount of distilled water. This solution which amounts to about 100 c.c. is put into centrifuge tubes which are placed in an ice bath for one hour and then centrifuged. The supernatant fluid is dialysed for 72 hours in cold running water ; it is then chilled and double the quantity of cold acetone is added with the addition of 0·5 c.c. of saturated solution of NaCl to facilitate precipitation, the precipitate being treated as before. After centrifuging, the supernatant fluid is taken and dried *in vacuo* over sulphuric acid. It may be stored in the form of a desiccated powder or in salt solution with or without phenol.

Skin tests on goats revealed that 75 per cent. of the original toxin was retained, whilst the total solids, nitrogen and phosphorus were considerably reduced.

R. LOVELL.

URBAIN, A. (1931). Nouvelle technique de préparation d'un sérum anticharbonneux. [**A New Technique for the Preparation of Anti-Anthrax Serum**]. —*C.R. Soc. Biol. Paris.* **107.** 477-480. [6 refs.]

Two previously described methods for the preparation of anti-anthrax serum were compared. In the case of one of them, a horse was immunised with the first and second anthrax vaccine, followed by virulent living cultures inoculated subcutaneously. In the case of the other, a horse was immunised by the injection of a mixture of living virulent bacteria and the heated, paper filtrate (10 minutes at 100° C.) of the ground-up organs of rabbits dead from anthrax. The latter method proved superior to the first.

An attempt was then made to find a substitute for the organs of animals which had died from anthrax. Suspensions of aleuronat and of various dead bacteria such as staphylococci, streptococci and *Bact. coli*, proved ineffective. An excellent result was obtained by the following method :—five strains of *B. pyocyaneus* were grown for three weeks on a synthetic medium [(1922). *C.R. Soc. Biol. Paris.* **86.** 774.] after which they were killed by heat (70° C. for one hour) and mixed. A mixture of this suspension and of virulent cultures of *B. anthracis*

(150 c.c. of culture and one dg. of bacilli) produced a local œdema, accompanied by pain, rise of temperature and loss of appetite when injected subcutaneously into the neck of a horse. Injections of doses of living *B. anthracis* were then given at intervals of 15 to 20 days. After about four injections the animal could receive about five to six dg. of culture. Serum collected 12 days after the last injection proved very active with regard to its protective power on guinea pigs. It also contained agglutinins, precipitins and complement fixing bodies for *B. anthracis*.

R. LOVELL.

Mazzucchi, M. (1931). Il nuovo vaccino anticarbonchioso "Carbozoo" nella sua constituzione e nelle sue applicazioni pratiche. [**The New Anti-Anthrax Vaccine Carbozoo. Its Composition and its Use in Practice**]. —*Clin. Vet. Milano.* **54.** 577-580.

Carbozoo is a suspension of fully virulent living anthrax bacilli and spores in 10 per cent. saponin. The action of the vaccine appears to depend upon the reaction produced in the body by the subcutaneous injection of the saponin. A marked local reaction occurs which acts as a defensive barrier. The bacilli retain their vitality and virulence and their antigenic powers.

The vaccine has been used on a large scale and the results are said to be satisfactory.

A. LESLIE SHEATHER.

I. Denys, J., & Rodhain, J. (1931). Sur l'inegalité de virulence du Bacille de la tuberculose d'après sa Provenance. [**On the Variation in Virulence of the Tubercle Bacillus according to its Origin**].—*C.R. Soc. Biol. Paris.* **107.** 270-271.

II. Ninni, C. (1931). Allure de l'infection tuberculeuse du Cobaye inoculé par voie lympho-ganglionnaire avec le Bacille tuberculeux aviaire. [**Type of Tubercular Infection of Guinea Pigs inoculated by Way of Lymph Glands with the Avian Type of Tubercle Bacillus**].—*Ibid.* 1046-1048. [3 refs.]

III. Paisseau, G., Ducas, P., & Weill, J. (1931). Sur la non-tuberculisation du Cobaye par l'inoculation de produits pathologiques humains bacillifères. [**On the Non-Infection of the Guinea Pig with Tuberculosis, after Inoculation of Human Pathological Products containing Bacilli**].—*Ibid.* 1104-1106. [1 ref.]

I. This paper contains an account of the examination of seven strains from different types of human tuberculosis. The virulence was tested by inoculating guinea pigs with doses varying from 1 c.c. of a suspension containing 10 millions per c.c., to 1 c.c. of a one in ten million dilution of this suspension. Virulence was assessed according to the dilution capable of killing a guinea pig. The strains varied in their virulence and the author considers that the opinion that virulence and origin are not usually correlated, except in the case of human lupus, should be revised.

II. The second paper deals with the infectivity of the avian type of tubercle bacillus for the guinea pig. Guinea pigs were inoculated directly into the lymphatic glands with cultures of the avian type of bacilli and with ground-up organs of fowls which had died of tuberculosis. Three stages of infection are described,

the first being of the Yersin type characterised by general hypertrophy and engorgement of the organs and the presence of large numbers of acid fast bacilli. From the twelfth to about the twenty-fifth day after infection the hepatic form is common, the chief lesion being small whitish spots which are present in the liver. The third stage is the period of recovery, and abscess of the inoculated glands may be present. Infected guinea pigs may die during the first or, occasionally, the second stage from an acute infection. Cultures from the organs appear to be positive up to the ninetieth day.

III. The third paper is a discussion of the observation that the authors have made, namely their inability to produce tuberculosis in guinea pigs by inoculation with certain pathological products containing acid-fast bacilli. This appears to have occurred most frequently when pleural effusion was used, notably in the case of material from a child suffering from acute rheumatism. The authors consider that the acid-fast bacilli may have been of modified virulence, as the child did not appear to be developing tuberculosis and did not react to tuberculin.

R. LOVELL.

DEICH. (1931). Beitrag zur Augenprobe. **[The Ophthalmic Test].**—*Berl. tierärztl. Wschr.* **47.** 713-718 & 729-735. 6 tables. [43 refs.]

This paper deals with experiments carried out by the author with a particular brand of tuberculin specially prepared in the form of an ointment for use in the ophthalmic test.

The author claims that, with this special preparation, there is a quantitative relationship between the intensity of the reaction and the character of the tuberculous infection.

A. LESLIE SHEATHER.

ACHARD, C., LEVY, J., & PACU, M. (1931). Le potassium dans les épanchements pleuraux d'origine tuberculeuse et dans le sang. Comparaison avec la teneur des sérosités et du plasma en sodium et en calcium. **[A Comparison of the Potassium, Sodium, and Calcium Contents of Tuberculous Pleural Effusions and of Plasma].**—*C.R. Soc. Biol. Paris.* **107.** 664-666. 2 tables. [9 refs.]

The potassium content of tuberculous pleural effusions is generally somewhat less than that of plasma. Fourteen results are given and, of these, three show the reverse result. Three experiments were carried out on sodium and calcium and in all of them the contents of the pleural liquids were less than those of the plasma. In the case of chloride, however, the plasma contained less than the pleural exudate.

W. R. WOOLDRIDGE.

BOSWORTH, E. B. (1931). **The Lymphocytic-Monocytic Ratio in Experimental Tuberculosis in Guinea Pigs.**—*Amer. Rev. Tuberc.* **23.** 318-324. 3 charts. [9 refs.]

A study of the blood picture of guinea pigs inoculated with tubercle bacilli has shown that, while the monocytes tend to increase in numbers, the lymphocytes tend to decrease in a direct ratio to the severity of the disease. The fact that this ratio might be of some prognostic value led the author to carry out the following experiments.

He inoculated two series of guinea pigs, one with virulent and the other with avirulent tubercle bacilli, ten animals receiving 0·2 c.c. of virulent culture subcutaneously in the groin and five receiving a similar quantity of a double strength emulsion of avirulent bacilli.

Differential blood counts on 200 cells were commenced at the fourth week, using the supravital technique of Sabin, one of the second group being killed for comparison as the animals of the first group died. A general description of the *post-mortem* findings in each group is given.

The average lymphocyte-monocyte ratio was much lower in the group inoculated with virulent bacilli and the author concludes from his experiments that the blood picture is an important indication of the way in which the disease is progressing, a high index indicating that the animal is putting up a good fight and a low index suggesting the reverse.

N. BARRON.

DOLGOPOL, V. B. (1931). **The Specificity of Avian Tuberculin Reactions.**—*J. Infect. Dis.* **49.** 216-224. 2 tables. [21 refs.]

This investigation concerns the possible occurrence of avian tubercle bacilli in the human subject, with special reference to the specificity of reactions to avian tuberculin. Intradermal tests with avian tuberculin on 62 patients suffering from advanced pulmonary tuberculosis yielded 36 positive, three doubtful and 23 negative reactions ; unfortunately, the author was unable to make comparative tests with mammalian tuberculins.

In order to determine whether avian tubercle bacilli could be recovered, material from 31 patients with advanced pulmonary lesions, of whom 13 gave positive skin reactions, 11 were negative and seven were not tested, was inoculated either intravenously or intraperitoneally into a series of chickens. The emulsions were prepared from (1) sputum rich in tubercle bacilli, and (2) tuberculous lung tissue and bronchial lymphatic glands. The results were essentially negative since no case of tuberculosis developed in the chickens.

It is concluded that a positive reaction to avian tuberculin does not necessarily indicate either a mixed avian infection or a latent avian infection confined to the lymphatic glands, but should be regarded as an indication of a group reaction in patients affected with the mammalian types of tubercle bacilli.

R. E. GLOVER.

BORDET, P. (1931). Réactions allergiques communes aux infections tuberculeuses et pseudo-tuberculeuses. **[State of Allergy common to Tuberculous and Pseudo-Tuberculous Infections].**—*C.R. Soc. Biol. Paris.* **107.** 1465-1467. [1 ref.]

In a previous communication, it was shown that a suspension of killed *B. coli* was capable of inducing in the tuberculous guinea pig a series of reactions analogous to those produced by tuberculin, i.e. local hæmorrhagic or necrotic lesions after subcutaneous inoculation, and intense hæmorrhagic infiltrations around tuberculous foci after intravenous inoculation.

In the present investigation, the observations have been extended to infection with the bacillus of pseudo-tuberculosis. Guinea pigs which were inoculated in the plantar cushion with very small doses of this organism developed local abscesses ; later, the organisms spread to the adjacent lymphatic glands and, finally, generalised lesions resulted. It was found that, five days after inoculation

the subcutaneous introduction of a killed suspension of *B. coli* provoked a train of symptoms identical with those occurring in the tuberculous animal. Similar necrotic reactions could be produced by suspensions of *B. pseudo-tuberculosis* itself, by *B. proteus vulgaris* in whole culture or by filtrates of four-day broth cultures ; on the other hand, staphylococci were inactive in this respect.

Attention is drawn to the close analogy between these phenomena and the reactions described by SANARELLI who showed that rabbits which had been prepared beforehand by a sublethal dose of cholera vibrios given intravenously were killed very quickly by the intravenous injection of a filtrate of *B. coli*.

R. E. GLOVER.

WEINZIRL, J., & BOHART, R. M. (1931). **Concerning the Desensitisation of Tuberculous Guinea Pigs.**—*Amer. Rev. Tuberc.* **23.** 393-408. 9 tables. [8 refs.]

After a brief introduction dealing with sensitisation of animals to various proteins, the subsequent production of anaphylactic shock and methods of desensitisation, the authors deal with the special problem of the possible desensitisation of tuberculous guinea pigs.

Guinea pigs were rendered tuberculous by the intraperitoneal or intracutaneous injection of *Myco. tuberculosis*. For desensitisation purposes, they were subsequently treated with injections of one of the following :—

(1) A dialysed filtrate from tubercle bacilli which had been grown on LONG'S synthetic medium for four months.

(2) Tuberculo-proteins precipitated by acetone from a similar filtrate and redissolved in normal salt solution.

(3) Tubercle bacilli killed by carbol-fuchsin.

(4) Tubercle bacilli which had been treated with ether for 30 days with removal of the soluble fats and proteins, and subsequent suspension of the residue in normal salt solution. The desensitising dose varied in amount and was divided into six subdoses given at half-hourly intervals.

The skin test, as carried out with old tuberculin, showed that desensitisation was only partially successful. When the systemic reaction was considered, however, desensitisation appeared to be more complete, as it largely eliminated the prostration usual after the administration of products of tubercle bacilli. Of the four preparations used, the ether-treated tubercle bacilli appeared to give the most satisfactory results, as the ether removes various lipoids and toxic proteins, but still leaves proteins suitable for desensitisation. No exact figures for dosage could be advocated because the dose varies with the different products. It should, however, fall below the amount that would arouse a violent reaction. A time interval of about seven days between dosing is advocated.

R. LOVELL.

VALTIS, J., & MONALDI, T. de S. (1931). Sur les modifications du pH des cultures en milieu synthétique de Sauton au bacille bilié de Calmette et Guérin. [**On the Modifications of pH of Cultures of BCG on the Synthetic Media of Sauton**].—*C.R. Soc. Biol. Paris.* **107.** 1249-1250. [1 ref.]

Three strains of BCG were grown in pyrex flasks containing Sauton's media with an initial pH of 7·2 to 7·5. Samples for testing the pH were taken with a glass capillary pipette every three days, precautions being taken against contamination. Employing the colorimetric method, a progressive alkalinity was demon-

strated till a pH of 8·2 to 8·6 was registered between the third and fourth week ; control flasks showed no modification. The authors conclude, therefore, that on Sauton's media BCG reacts in the same manner with regard to change of pH as the bovine type of tubercle bacillus, and they maintain that the S colonies, isolated from BCG by PETROFF and found by COOPER [(1930). *J. Biol. Chem.* **88.**] to react in a similar manner to tubercle bacilli of the human type on Sauton's media, were an accidental contamination.

R. LOVELL.

MONALDI, T. de S. (1931). La culture du BCG dans le sang du Cobaye selon la méthode de Wright. [**Culture of BCG in Guinea Pig's Blood according to Wright's Method**].—*C.R. Soc. Biol. Paris.* **107.** 225-228.

Adopting for BCG the technique demonstrated by WRIGHT for the cultivation of tubercle bacilli in blood clots in sealed Pasteur pipettes, it was found that BCG could be passaged in the clots from the blood of guinea pigs, but that this procedure did not modify either its virulence for the guinea pig or its morphological characters. Only four subcultures are recorded and the total number of guinea pigs used for the testing of virulence appears to be 19.

R. LOVELL.

MONALDI, T. de S., & BASSI, U. (1931). Sur l'inoculation intracornéenne de BCG au jeune Lapin. [**On the Intracorneal Inoculation of BCG in the young Rabbit.**]—*C.R. Soc. Biol. Paris.* **107.** 1060-1061. [1 ref.]

The reaction of young rabbits to the intracorneal inoculation of suspensions of BCG has been demonstrated ; 43 rabbits were used for the purpose. The technique consisted of the installation of a few drops of bacillary suspension on to the eye and scarification of the cornea. The lesions were transient and tended to heal. Twenty-two of the animals were killed between the thirteenth and sixtieth day. None of them showed lesions of tuberculosis in the viscera. Ten rabbits died between the fourth and fifty-fifth days after inoculation ; of these, three died from pasteurellosis, three from coccidiosis and four from pseudo-tuberculosis. The remainder were killed after the sixtieth day. The authors conclude that BCG introduced in this manner may live and multiply for two or three months without any increase in virulence, producing local curable lesions only.

R. LOVELL.

DRUCKER, P. (1931). Au sujet d'une observation d'une infection pulmonaire par le BCG suivie de guérison rapide chez un nourrisson après vaccination par voie buccale. [**An Observation of a Pulmonary Infection by BCG in a foster Child after Oral Vaccination followed by rapid Recovery**].—*Ann. Inst. Pasteur.* **47.** 39-44.

This is a description of a child of tubercular parents, who was vaccinated orally with BCG five, seven and eight days after birth, and immediately isolated from its mother. After six weeks, the child failed to develop normally and BCG was found in the stomach washings. The author believes that these bacilli were swallowed by the child and that they had arisen from a primary pulmonary infection. He believes that the primary pulmonary infection was due to aspiration of a portion of the BCG vaccine. The child developed normally

after a short period and the author emphasises the benign nature of the infection.

R. LOVELL.

NINNI, C., & MONALDI, T. de S. (1931). Sur l'immunité paraspécifique déterminée par le BCG à l'égard de l'infection charbonneuse. [**On the Paraspecific Immunity induced by BCG with regard to Anthrax Infection**]. —*C.R. Soc. Biol. Paris.* **107.** 1246-1248. [1 ref.]

The authors state that it is well known that the general mortality in children vaccinated *per os* with BCG is less than in those which are not vaccinated and that this applies not only to a reduction in the mortality due to tuberculosis, but also in that due to other diseases of children. They endeavoured to test the truth of this statement experimentally by immunising guinea pigs intradermally with BCG and subsequently testing them with a lethal dose of anthrax vaccine. The guinea pigs were divided into four lots :—of six tested seven days after immunisation with BCG, all died ; of seven tested after 15 days, all died ; of nine tested after 22 days, four survived ; and of ten tested after 28 days, five survived.

A second series of guinea pigs immunised by the subcutaneous route were also tested, and a proportion of those which were tested after 28 days survived the test dose of anthrax vaccine.

The authors conclude from their experiments that BCG confers on guinea pigs an immunity to subsequent inoculation with *B. anthracis*, but that the immunity is not evident until 28 days after inoculation. They consider, therefore, that the immunity is not due to antagonism of the bacteria.

R. LOVELL.

I. van DEINSE, F. (1931). Recherches sur la symbiose du BCG avec des Bacilles tuberculeux virulents du type humain dans la même culture. [**Study on the Symbiosis of BCG with Virulent Tubercle Bacilli (Human Strain) in the same Culture**].—*C.R. Soc. Biol. Paris.* **107.** 112-114.

II. MONALDI, T. de S. (1931). Le BCG peut-il devenir virulent par culture dans le sang total de Lapin ? [**Can BCG become Virulent by culturing in the Whole Blood of Rabbits?**].—*Ibid.* 495-497. [3 refs.]

I. A certain periodicity in the mortality was observed in the catastrophe which occurred at Lübeck in 1930 among children inoculated with BCG vaccine. After a period of recrudescence, there was a marked decline in the mortality among the later inoculated children.

Van Deinse thought that this might possibly be attributed to the crowding out of the virulent bacillus with which the cultures were contaminated by the more rapidly growing BCG as the result of repeated subculture. Experiments showed, however, that this periodicity in the mortality could not be attributed to any diminution in the virulence of the contaminated cultures. The author believes that the results obtained in his experiments indirectly confirm the view of the German experts that, among the cultures used in the preparation of the vaccine, some were contaminated while others were pure cultures of the BCG.

II. In view of the claim put forward by SASANO and MEDLAR [(1931). *Amer. Rev. Tuberc.* **23.** 215-222.] and by DREYER and VOLLUM [(1931). *Lancet.* **220.** 9-15.] that they succeeded in restoring the virulence to BCG by cultivating it under special conditions, Monaldi attempted to confirm these results by culturing

the BCG in rabbit blood in sealed pipettes under a reduced oxygen tension. He found that cultivation of the BCG strain in series by this method did not cause any modification of its virulence, but that it produced some morphological changes in the organisms.

T. M. DOYLE.

SAENZ, A. (1931). Recherches expérimentales sur les effets réciproques du BCG et des infections concomitantes par le bacille de Preisz-Nocard et par le streptocoque étudié par Hormaeche à Montevideo. [**Experimental Studies on the Reciprocal Effect of BCG and Concomitant Infections by the Preisz-Nocard Bacillus and by the Streptococcus studied by Hormaeche at Montevideo**].—*Ann. Inst. Pasteur.* **47.** 221-240. [7 refs.]

Reference is made to the experience of HORMAECHE and MACKINNON who found a caseous peritoneal abscess, containing acid-fast bacilli, in a guinea pig which had died 26 days after an injection of BCG. Passage revealed a streptococcus and an acid-fast bacillus ; the latter eventually appeared to be capable of producing generalised tuberculosis in the guinea pig. HORMAECHE and MACKINNON considered this to be evidence of exalted virulence of BCG acting in concert with this strain of streptococcus.

To test whether BCG may recover its virulence *in vivo*, the author has carried out experiments using not only this same strain of streptococcus, but also the Preisz-Nocard bacillus. He found that inoculation of BCG after infection with the Priesz-Nocard bacillus gave merely transitory infection and did not enhance its virulence. He also found that BCG inoculated into guinea pigs which were already infected, or were infected simultaneously or afterwards with the streptococcus used by HORMAECHE and MACKINNON, retained its degree of attenuation. Passage of the tissues of infected animals from guinea pig to guinea pig showed a diminution of acid-fast bacilli and apparent disappearance at the third passage. His findings are therefore not in agreement with those of HORMAECHE and MACKINNON.

R. LOVELL.

BURGGRAAF, H. (1931). Paratuberkulose op de Oostkust van Sumatra. [**Johne's Disease on the East Coast of Sumatra**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 359-362.

Johne's disease has only been recognised in the Dutch East Indies during the last few years and it is still only rarely seen.

The author gives a report of a case which he diagnosed by bacteriological, clinical and *post-mortem* examination. In the Dutch East Indies the disease runs a more acute clinical course (one to four weeks) than in Europe. Cattle between five and eight years old are those most commonly affected.

He also tested the diagnostic value of avian tuberculin in doses of 10 c.c. of a 20 per cent. solution, given subcutaneously, on six head of cattle suspected to be infected ; the results were indefinite.

In a footnote, the editor of the journal quotes from the annual reports for 1928 and 1929 of the Government Veterinary Surgeon at Buitenzorg which show that the presence of Johne's disease in the Dutch East Indies is an established fact.

J. T. E.

CARPANO, Matteo. (1931). Contributo alle conoscenze delle infezioni da Difteroidi negli equini specialmente in Egitto. I. Linfangite ulcerosa. II. Dermite necrotica. [**Infection of Equines with Diphtheroids, particularly in Egypt. I. Ulcerative Lymphangitis. II. Necrotic Dermatitis**].—*Clin. Vet. Milano.* **54.** 747-773. 1 table, 14 figs. on 4 plates. [16 refs.]

Both ulcerative lymphangitis and epizootic lymphangitis occur in Egypt and they have several clinical features in common. The author's systematic examination of cases of lymphangitis in equines has enabled him to show that the cause of ulcerative lymphangitis is the Preisz-Nocard bacillus whose morphological and cultural characters are dealt with at considerable length. The organism varies considerably in virulence as judged by the subcutaneous inoculation of guinea pigs.

Under natural conditions infection takes place both by direct and by indirect contact. The possibility is not excluded that, in hot moist countries, blood-sucking ecto-parasites may play a part in the transmission of the disease.

Clinically, the disease is manifested by inflammation of the lymphatic vessels. There is a great tendency for the disease to appear, in the first instance, at the lower part of a limb, particularly a hind limb.

Differential diagnosis—covering ordinary lymphangitis produced by common pyogenic bacteria, farcy, epizootic lymphangitis and sporotrichosis—is based upon a complete bacteriological examination of the pus.

Agglutination and ophthalmic tests have not given results of any great value for the purpose of diagnosis. Similarly, a test carried out on the lines of the Schick test has not proved to be of value.

A. LESLIE SHEATHER.

CRAIGIE, J. (1931). **Studies on the Serological Reactions of the Flagella of** *B. typhosus.*—*J. Immunol.* **21.** 417-511. 26 tables, 33 figs. [74 refs.]

The flagella from suspensions of *Bact. typhosum* have been separated from the bodies by mechanical means and the author has studied the serology of the separated portions. His conclusions that the floccular agglutination of *Bact. typhosum* is dependent on the presence of flagella and can be identified with the " H " receptor of WEIL and FELIX, and that the flagellar agglutinin is the corresponding " H " or labilotropic agglutinin, are in agreement with most authors. So also is his statement that violent shaking, heat, or growth on phenol agar, reduce typhoid bacilli to a state when only granular agglutination is observed, and that the somatic agglutinin developed in response to the inoculation of steamed deflagellated bacteria is the " O " or stabilotropic agglutinin.

On the other hand he observes that a presumably pure suspension of flagella, although not agglutinated by a somatic serum, may on inoculation into an animal give rise to agglutinins for the heat stable fraction of the bacillus. Also inoculation of steamed suspensions of *Bact. typhosum* may give rise to small amounts of flagellar agglutinin. He emphasises the suitability of formolised suspensions for indicating flagellar agglutinin and their unsuitability for the detection of somatic agglutinin.

Precipitin reactions revealed that flagellar suspensions lysed by heat or treatment with alcohol contain a substance capable of specific precipitin reaction with sera containing either flagellar or somatic agglutinin. Complement fixation tests also showed that flagellar suspensions may fix complement in the presence both of somatic and of flagellar agglutinating sera.

His main thesis appears to be that, although the " H " receptor of WEIL and FELIX is the intact flagellum, yet lysis of the flagella, and thereby its reduction to a physical state in which it is not demonstrable by an agglutination reaction, does not deprive it of its *in vivo* activity or of its *in vitro* activity as far as complement fixation and precipitin reactions are concerned. Furthermore he affirms that, as flagella are much more sensitive to the action of agglutinating sera than are somata, then the antibody content of flagellar and somatic sera cannot be legitimately compared on the basis of agglutination titres. He therefore doubts the importance of the " O " as compared with the " H " which appears to be contrary to the opinion of most authors.

R. LOVELL.

WELCH, W. H. (1931). **Some Aspects of Pullorum Disease Control.**—*North Amer. Vet.* **12.** No. 7. 40-43.

The author believes that in Illinois pullorum disease is, at a conservative estimate, responsible for a death rate of 33 per cent. among chicks within the first three weeks of life.

He recommends the frequent application of the agglutination test as the quickest and most economical means of eradicating the infection.

T. M. DOYLE.

WEAVER, H. J., & WELDIN, J. C. (1931). **Incidence of *Salmonella pullorum* in the Eggs from Reactor Hens.**—*Poultry Sci.* **10.** 118-119. 1 table. [4 refs.]

It is well known that there is wide variation in the number of eggs infected with *B. pullorum* which are laid by " carrier " hens.

The authors carried out experiments to ascertain whether the organisms were excreted in the eggs at regular or at irregular intervals. A total of 775 eggs laid by 20 reactor hens were examined over a period of three months and no evidence was found of any regularity in the elimination of *B. pullorum*.

T. M. DOYLE.

BRUNETT, E. L. (1931). **Pullorum Disease in the Mature Turkey.**—*Rep. New York State Vet. Coll. for Year 1929-1930.* pp. 105-108. 1 table. [4 refs.]

The author records that eight turkeys out of a flock of 157 gave positive reactions to the agglutination test with a *B. pullorum* antigen. On the same farm there was a flock of 1,195 fowls, all of which gave negative reactions to the test.

B. pullorum was isolated from the ovary of a turkey hen (No. 2) which had a titre of 1 : 320. Two of the birds (Nos. 2 and 3) had ovarian lesions similar to those which occur in fowls affected with *B. pullorum*.

The significance of this finding lies mainly in the possibility that adult turkeys may keep infection alive on a farm after the disease has been eradicated from the fowls. In any scheme for the eradication of pullorum disease it would appear advisable to include turkeys.

T. M. DOYLE.

FLEISCHHAUER, G. (1931). Der Wert der Agglutinationsmethode bei der weissen Ruhr. [**The Value of Agglutination Tests in Bacillary White Diarrhœa**].—*Deuts. tierärztl. Wschr.* **39.** 584-590. 2 tables. [15 refs.]

The author presents, largely in tabular form, the results of parallel tests for " bacillary white diarrhœa " carried out by the rapid fresh blood method and by the slow dilution method ; he also records the *post-mortem* findings and results of the bacteriological investigation on a large number of birds. The records are compared in various ways and the general conclusion is that the slow method is the better for the detection of infection, and that the rapid method, although it is simple and can be carried out on the premises, has not really anything to recommend it as superior to the slow method.

Dilutions of 1 : 50 and 1 : 100 were used in the slow method, but, as is frequently the case in articles dealing with agglutination tests, no information is given as to the density of the bacterial suspension used. It is, however, stated that even partial agglutination at 1 : 50 cannot be considered as positive.

A. LESLIE SHEATHER.

SACHWEH, Paul. (1931). Der Wert der Agglutinationsmethoden bei der weissen Ruhr. [**The Value of the Agglutination Test in " Bacillary White Diarrhœa "**].—*Deuts. tierärztl. Wschr.* **39.** 582-583. [1 ref.]

The author produces figures to show that the agglutinin content of the blood of fowls infected with " white diarrhœa " [*B. pullorum* infection] may vary very greatly from time to time. He emphasises the fact that a change from a pronounced positive to a completely negative result may occur within a brief period. This is a matter which requires investigation as the owners of birds are beginning to look upon the test with mistrust.

The latter part of the article is directed against practitioners carrying out tests in the field. The author strongly maintains the view that all serological tests must be carried out in laboratories if reliable results are to be looked for.

A. LESLIE SHEATHER.

COTTON, W. E. (1931). Aborto infeccioso de la vaca, de la cerda y de la oveja en los Estados Unidos. [**Bovine, Porcine and Ovine Contagious Abortion in the United States**].—*Revista Zootec.* **18.** 257-269.

This is a reprint of an article which appeared in " *El Noroeste de Méjico* " in 1930. It gives a summary of the existing conditions and contains nothing new.

A. LESLIE SHEATHER.

RICH, L. H. (1931). **Economic Factors of Abortion in Cattle.**—*Cornell Vet.* **21.** 15. 3 tables.

The author states that the direct and indirect annual loss from contagious abortion in the U.S.A. has recently been estimated at $175,000,000.

The breeder of pure-bred stock is usually cognisant of the serious losses caused by abortion, but the average dairyman or farmer generally fails to appreciate the heavy financial drain caused by the disease.

The losses occur under four main headings :—(1) milk production ; (2) loss of calves ; (3) depreciation, and (4) breeding difficulties.

The period of gestation at which cows abort has a considerable influence on the subsequent output of milk, as the more advanced the gestation, the greater the milk supply.

It is estimated that the average productive life of cows affected with abortion disease is one year less than that of normal cows.

The main loss in breeding efficiency results from uncertain breeders and from the high percentage of animals which become sterile.

It is of interest to note that, in reply to a questionnaire sent out by the author, 103 dairymen out of 114 stated that, from their experience, contagious abortion caused an increase of breeding troubles.

The loss in the average herd of 16 cows, figured from a percentage standpoint with reference to the various factors involved, as found in this study would be as follows: (a) Commercial herd basis—(1) butterfat loss 39·1; (2) calf loss 17·1; (3) depreciation 2·9; (4) sterility 20·9. (b) Pure bred herd basis—(1) butterfat loss 17·7; (2) calf loss 41·2; (3) depreciation 20·1; (4) sterility 18·3; (5) veterinary expenses 2·7.

T. M. DOYLE.

HADLEY, F. B., & WELSH, W. E. (1931). **On the Persistency of the Agglutination Reaction for** *Brucella abortus*.—*Cornell Vet.* **21.** 286-291. 3 tables. [1 ref.]

The authors state that a certain proportion of cows which react positively to the agglutination test, especially those which react only in low dilutions, may in time overcome infection.

By frequent testing of a herd over a period of two years, it was found that a relatively large number of high titre reactors developed into low-titre reactors, while a small number overcame infection. All cows with low titres eventually became non-reactors.

The authors consider that, in view of these observations, cows which react to the agglutination test during the height of an abortion " storm " need not be immediately removed from the herd. They suggest testing the herd over a period of months and disposing only of those animals which continue to give a positive reaction.

T. M. DOYLE.

GILMAN, H. L. (1931). **Further Studies on the Relation of the Milk Agglutination Titre to the Elimination of** *Bact. abortus* **from the Udder of the Cow.**—*Cornell Vet.* **21.** 243-251. 1 table. [9 refs.]

This is a continuation of work previously reported by Gilman [(1930). *Cornell Vet.* **20.** 106.], its object being to determine whether there is any correlation between the milk agglutination titre and the presence of *Br. abortus* in the udder.

The milk agglutinins are undoubtedly specific and are the result of the presence of *Br. abortus* in the udder. Apparently they do not arise in the blood stream as many cows show a negative milk titre, but a high blood titre.

The milk from all four quarters of 113 cows was examined for agglutinin content and was tested for the presence of *Br. abortus* by inoculation into guinea pigs. The organism was isolated from the milk of 62·9 per cent. of cows showing a positive (1 : 80) blood titre and from 78 per cent. of those showing a positive (1 : 80) milk titre. It was recovered from five samples of milk showing a titre of less than 1 : 80.

The author concludes that there appears to be a considerable degree of correlation between the milk titre and its *Br. abortus* content.

T. M. DOYLE.

ZIEGLER, M., & TEICHMANN, R. (1931). Ueber das Ergebnis der Bekämpfung des ansteckenden Verkalbens durch Impfung im Freistaat Sachsen. **[Results of the Campaign against Contagious Abortion by Vaccination in Saxony].**—*Deuts. tierärztl. Wschr.* **39.** 698-701 ; 714-718. 8 tables.

Contagious abortion is one of the diseases controlled in the course of the campaign against diseases connected with breeding ; about 26,000 animals in 1,250 herds are at present controlled. Each herd is examined quarterly by the veterinarian of the provincial authority who decides what measures are applicable ; vaccination and necessary treatment are then carried out by the local veterinarian.

According to this plan, non-pregnant animals under control received two doses of living vaccine at 14 day intervals ; dead organisms were used for pregnant animals. Tabulated results appertaining to 6,560 animals in 185 herds are given, and grouped as regards the time at which vaccination was carried out. From these results it seems clear that in all classes of animal vaccination four or more weeks before service was of much greater value than later treatment. For example, amongst herds in which the abortion figure was about 20 per cent. before inoculation, such vaccination caused a reduction to six to eight per cent. The abortions which did occur were, moreover, comparatively late. Vaccination up to four weeks after service led to a reduction to only 13 per cent. whilst later vaccination had no beneficial effect. These figures were the averages for two years, presumably successive. In many herds of 20-40 animals, and in most smaller herds, abortion came to a standstill. Vaccination with dead organisms was found to be of no value in animals which were already infected ; with regard to others no definite conclusion was reached, but it is considered indispensable where the extent of infection cannot be clearly seen.

A second section of this article deals with the effect of the injection of living vaccine on the frequency of sterility, and with the treatment of the latter. After a short review of previous reports, observations on over 3,000 inoculated animals in 185 herds are given and, as in previous tables, young animals and animals bought from outside are considered separately ; a further division is made into those which had previously calved normally, those which had aborted and those in which retention of fœtal membranes had occurred.

About 7,000 inoculated animals were used as controls ; they were not a perfect control, however, because many had been inoculated at some earlier date, whilst others came from herds in which disease, although not active at the time, nevertheless existed. It is concluded that the sterility figure is not greater than in abortion-free herds and that, following routine vaccination, it decreases. The results of treatment are considered useful and are similar in inoculated and uninoculated groups. A table of the results of vaccination recorded by other workers is given.

A. W. STABLEFORTH.

ZWICK. (1931). Die Bekämpfung des infektiösen Abortus durch Impfungen. **[The Campaign against Contagious Abortion by means of Vaccination].**—*Deuts. tierärztl. Wschr.* **39.** 705-711.

In a review of our knowledge regarding methods of control, the author first refers to the early experiments of BANG (B) and of M'FADYEAN and STOCKMAN who demonstrated that protection could be satisfactorily conferred on non-pregnant animals by vaccination with living cultures six to eight weeks before service.

The experiments of the Reichsgesundheitsamt (1920) confirmed this on over 3,000 animals and also suggested that serum might add something to the value of dead vaccines. The work of SCHERMER and EHRLICH, of O. BANG and of SMITH and LITTLE and particularly the recent intensive vaccination campaigns reported by PRÖSCHOLDT and by SCHUMANN have added further confirmation of the value of living vaccines in badly infected herds. PRÖSCHOLDT found that the percentage of abortions in 4,200 animals was lowered from 30·2 to 3 per cent. in one year. SCHUMANN reported a decrease from 22 per cent. to 6·6 per cent. for a period of three years during which routine vaccination was carried out on 6,223 animals in 106 herds, living vaccines being used on the non-pregnant animals and dead vaccine on the pregnant. In emphasising the necessity of regular treatment, this worker reports that in certain herds where vaccination was irregular and incomplete, a drop to only 13·5 per cent. was found. The author refers to the results of HADLEY and of JENSEN who found that immunisation of heifers was much more difficult.

He considers that hygienic measures should not be overlooked because massive infection may overcome an otherwise useful immunity. Considering the objections to vaccination commonly raised he concludes that although positive reactions are induced they disappear rapidly and that the absence of good results is often due to late vaccination ; also that abortion actually due to vaccination can only occur if living vaccines are used on pregnant animals or, possibly, heifers. He emphasises the fact that abortion should be considered a disease of several calving periods.

Regarding the possibility of an increase in human infection, attention is drawn to the fact that by far the larger number of cases occur in those in actual contact with cattle and that, as SCHUMANN has reported, the actual number of excreters judged by cultural examination of mixed milk samples is not increased by vaccination with living organisms. Referring to the new orders regarding milk control he points out the difficulty of enforcing the heating of infected milk and the danger that too rigid regulations may cause concealment of the disease and an actual spread.

The conclusion is reached that although hygienic measures must never be disregarded, the eradication of abortion by that means is not economically possible except in suitable and slightly infected herds. Vaccination with living culture is to be recommended and entails no great danger to human beings.

A. W. STABLEFORTH.

FINOTTI, Edilio. (1931). Note pratiche intorno alla febbre di malta in Sardegna. [**A Practical Note regarding Malta Fever in Sardinia**].—*Clin. Vet. Milano.* **54.** 814-817.

It is not a simple matter to diagnose Malta fever in goats clinically, but the author holds that an important distinction between the abortion in goats caused by *Br. melitensis* and that from other occasional causes is the fact that the former occurs at all periods of the year whereas, in other cases for which as yet no satisfactory explanation has been offered, a large percentage of the herd may abort within a few days.

The resistance to infection increases with age, but in some animals abortion occurs more than once. In Sardinia, it is not thought that indirect contact plays any important part in the spread of the disease.

Malta fever is of importance from the economic point of view and possibly even more so from the medical point of view.

Losses of young animals and of milk, the possibility of infected animals aborting as many as four times, the death of kids within two or three months of birth, loss of condition and the persistent poorness of infected animals, and permanent sterility are all factors of great economic importance.

The infection of up to 30 per cent. of the herds is of serious moment from the point of view of human medicine.

The use of a formolised vaccine is said to reduce the cases of abortion very markedly, but the use of such a vaccine will not result in the complete stamping out of the disease and far greater attention will have to be paid to methods of protection if this is to be achieved.

A. LESLIE SHEATHER.

CURRAN, H. R. (1931). **Influence of Osmotic Pressure upon Spore Germination.** —*J. Bacteriol.* **21.** 197-209. 6 tables, 1 fig. [7 refs.]

CURRAN, H. R. (1931). **Influence of Surface Tension upon the Germination of Bacterial Spores.**—*Ibid.* 211-218. 1 table, 1 fig. [7 refs.]

The effects of variation of surface tension (air-medium interface measurements) and of osmotic pressure of media upon the germination of spores of *B. mycoides* were studied. Observations were made on hanging drop preparations contained in small, paraffin-sealed chambers, the criterion of spore germination being arbitrarily chosen as that stage when the spore envelope is actually ruptured. For rapid measurement, 100 cells were counted each time, note being made of the number which germinated. The osmotic pressure was measured by freezing point experiments and was usually varied by the addition of salts to a peptone medium, the latter being diluted for lower pressures. In the surface tension experiments plain infusion agar was used as medium, the surface tension being lowered by the incorporation of sodium oleate in the medium.

The results of the surface tension experiments indicated that the spores are comparatively insensitive to relatively wide variations in this factor. With depressions greater than 15 degrees, spore germination was inhibited, but this is normally outside biological conditions. Osmotic pressure, however, affects germination considerably, it being most rapid and complete at relatively low osmotic pressures. The optimum pressure for germination is lower than the optimum for maximum vegetative growth. The exact optimum varies with the nature of the medium, but there is a limiting minimum concentration of nutrient material below which germination will not take place. Hence an increased food supply may retard the rate of germination owing to the unfavourable osmotic pressure created by the added nutrients.

W. R. WOOLDRIDGE.

MUTTERMILCH, S., & SALAMON, E. (1931). Contribution à l'étude de la Seroprophylaxie et de la Serotherapie du Tetanos. [**A Contribution to the Study of the Serum-prophylaxis and Serum-therapy of Tetanus**].—*Ann. Inst. Pasteur.* **48.** 277-296. 10 tables. [13 refs.]

Earlier authors have shown that, whereas subcutaneous or intravenous inoculation of antitetanic serum a few hours after inoculation of tetanus toxin was useless, the inoculation of antitetanic serum directly into the cerebrum or into the subarachnoid space was efficacious even 30 hours after injection of toxin. These earlier authors experimented on guinea pigs, horses and dogs. Muttermilch and Salamon have used rabbits. They have recently demonstrated that, in order to prevent toxin from attacking the cerebrum, antitoxin must be present in the cerebrospinal fluid. In the series of experiments recorded here, they have shown :— (1) that to demonstrate the superiority of subdural inoculation of antitoxin over subcutaneous inoculation, a certain interval of time should be allowed between the inoculation of antitoxin and the subsequent intramuscular injection of toxin ; (2) that a much smaller amount of antitoxin is needed for complete protection in subdural inoculation, and (3) that whereas subcutaneous inoculation of antitoxin even in large doses, was useless, minute amounts injected subdurally were efficacious even 24 hours after intramuscular injection of lethal doses of toxin.

Further experiments were carried out in order to ascertain where the antitoxin meets and neutralises the toxin. The authors have come to the conclusion that they meet in the cells of the central nervous system and not in the cerebrospinal fluid or peripheral nerves. In their experiments they found :—

(1) That antitoxin could not be demonstrated in the peripheral nerves of rabbits inoculated subdurally with antitetanic serum.

(2) That if toxin were injected subdurally, it could be demonstrated four and six hours later in the blood, cerebrospinal fluid, brain, medulla and cord, but not in the peripheral nerves ; if injected intravenously, it could be demonstrated four and six hours afterwards in the blood, but not in the cerebrospinal fluid or the nervous system.

(3) That antitoxin was present in the brains of rabbits which had been inoculated intracerebrally 24 hours previously with antitoxin, but not in the brains of rabbits inoculated intravenously with antitoxin. The method of demonstration was to inoculate mice with a lethal dose of toxin mixed with undiluted and with diluted brain emulsion.

(4) That emulsions of the brains of rabbits inoculated intracerebrally with normal horse serum did not protect mice against a lethal dose of toxin.

(5) That antitoxin injected intracerebrally became fixed at once and could be demonstrated in the brain of inoculated rabbits six days later, after which it disappeared.

(6) That absorption of antitoxin by brain emulsion occurred *in vitro*.

(7) That the grey matter absorbed antitoxin equally as well as the white matter.

In the treatment of tetanus in man, the authors advocate subdural inoculation of antitoxin and also subdural inoculation of anatoxin, i.e. formalised toxin, which they found to stimulate the early appearance of antitoxin in the circulatory blood of inoculated rabbits. They consider that the injection of toxin-antitoxin mixture is analogous to Besredka's method of vaccinating with mixtures of bacteria and antibodies.

C. McG.

DISEASES CAUSED BY PROTOZOAN PARASITES.

Lwoff, M. (1931). La nature de la substance du sang indispensable aux trypanosomides. [**The Nature of the Substance in the Blood Essential to**

Trypanosomes].—*C. R. Soc. Biol. Paris.* **107.** 1234-1236. [3 refs.]

Hæmatin, like blood, when added to a vegetable peptone medium will greatly facilitate the cultivation of trypanosomes. One part in 5,000 of blood gives growth comparable with one part in 80,000 of hæmatin. These concentrations are similar to those necessary for the growth of *Bacillus influenzae*. The action of hæmatin seems to be associated with its peroxidase activity, and it can be replaced by vegetable peroxides or by the artificial peroxidase of WOLFF.

W. R. WOOLDRIDGE.

DISEASES CAUSED BY FILTRABLE VIRUSES.

FINDLAY, G. M., & HINDLE, E. (1931). **Combined Use of Living Virus and Immune Serum for Immunisation against Virus Infections.**—*Brit. Med. J.* May 2nd. 740-742. [18 refs.]

The authors consider that none of the methods at present employed in immunising against human virus infections is completely satisfactory.

The value of viruses attenuated by chemical means is considerably impaired by the absence of any reliable method of standardisation so that the potency of the vaccines varies. This is a serious disadvantage which may result in insufficient attenuation and consequent risk of general infection following inoculation.

Immune serum has been successfully used against yellow fever and, although it has the advantage over vaccines of conferring immediate protection, the duration of the immunity is short, usually not more than a few weeks.

The authors review briefly the serum-virus method as employed against rinderpest, swine fever and dog distemper and consider the feasibility of using the method against certain human virus infections.

With this object in view, they carried out experiments to determine whether a satisfactory degree of immunity could be obtained against vaccinia and yellow fever with the serum-virus method.

They found that, by the inoculation of vaccinia virus and immune serum, a degree of protection, equal to that produced by living virus, could be conferred on rabbits without giving rise to any local reaction.

It is well known that the serum of a patient recovered from yellow fever has a high protective value, but unfortunately the protection is of short duration.

The authors proved conclusively that monkeys could be actively immunised against yellow fever by the inoculation of a mixture of serum and virus, without the reproduction of any apparent ill-effects [see this *Bulletin*. **1.** 295].

T. M. DOYLE.

MAITLAND, M. C., & MAITLAND, H. B. (1931). **Detailed Report of Work at the Department of Bacteriology and Preventive Medicine, The University, Manchester. Appendix IV.**—*Fourth Progress Report of the Foot and Mouth Disease Research Committee, Ministry of Agriculture & Fisheries, Great Britain.* pp. 345-359. [7 refs.] London : H.M. Stationery Office. [7s. 6d.]

CULTIVATION OF FOOT AND MOUTH DISEASE VIRUS.

Attempts have been made to cultivate the virus in a medium of chick embryo in clotted hen plasma. The virus used for the inoculum was that contained in

guinea pig vesicle fluid ; in this medium it usually died out within 24 hours, but alteration of pH was not considered to be the cause of this short period of survival. The suggestion is made that the result obtained is possibly evidence of a species peculiarity of chicken tissues or serum.

Experiments were made using the finely minced pads, lips and tongue of guinea pig embryos with the addition of fresh heparinized guinea pig plasma. In some cases hairy skin was included and appeared to be quite satisfactory. The virus was cultivated through 17 successive cultures, and in some cases it multiplied about 1,000 times in one culture ; in one exceptional case the figures reached 10,000 during 3-4 days' incubation. The titre of the cultures usually reached 1 : 10,000, the highest noted being 1 : 100,000. Embryos of different ages were used, but this factor did not always produce a gradation in the amount of the tissue growth. There did not appear to be any relation between the growth of tissue in the cultures, and the growth of the virus. The addition of 10-14 per cent. of embryonic extract (embryos almost at term) to embryonic tissue cultures did not improve the growth of the virus.

There is some evidence that the addition of 1-2 per cent. of proteose to the tissue cultures probably increased the amount of the growth of virus. The addition of one 1 per cent. of glucose, or 0·75 or 2 per cent. of *liquor trypsinae co.* to the medium, apparently accelerated the rate of growth of the virus. In tissue cultures of adult guinea pig kidney, growth of the virus was not noted, although it survived at least 11 days, a period as long as in the cultures of embryo tissues.

Guinea pigs which had recovered a month previously from infection produced with virus from the eighth culture were tested by intramuscular inoculation of 1 c.c. of vesicle fluid (from a guinea pig) ; no lesions developed.

Trials have been made using minced adult guinea pig kidney in serum and Tyrode's solution. The survival was good in this medium but the authors do not claim that growth was definitely obtained, although it was found to promote the growth of vaccinia virus. Various modifications of the culture medium were tried without success.

NORMAN DOBSON.

DALLING, T. (1931). **Canine Distemper Immunisation. Use of Various Prophylactics in Hunting Packs.**—*Vet. J.* **87.** 553-558.

In this communication the author recapitulates the results which he has obtained in the field from the use of various methods of prophylaxis against distemper in foxhound kennels. The methods used were (1) serum and virus simultaneously side to side ; (2) vaccine followed by virus, and (3) two doses of vaccine. The results may be summarised as follows :—

(1) SERUM AND VIRUS.—Reports were received from 34 packs (552 couple) ; the results in 22 packs were classified as good, in eight as moderately good and in four as bad.

(2) VACCINE FOLLOWED BY VIRUS.—Reports were received regarding 23 packs in which, out of 1,025 hounds, 20 were reported as having developed illness, from which 14 recovered and six died. Twelve (1 per cent.) failed to withstand " infection " later.

(3) TWO DOSES OF VACCINE (" DOUBLE VACCINE ").—In this series, reports were received from 479 couple of hounds in 19 packs, and results are classified as follows :—good, eight packs ; moderately good, five packs ; and bad, six packs. In this connection, the author states :—" Because of the unreliability of the method

we do not at present advise the use of two doses of vaccine for immunising hounds against distemper."

In all these experiments the virus used was dried but the method of drying is not described. [A method of drying distemper virus was described by DUNKIN and LAIDLAW (1931). *J. Amer. Vet. Med. Ass.* **78.** 545-551.].

The author arrives at the following conclusions :—

Immunity produced by two doses of distemper vaccine without the use of living virus may, in some instances, be of low degree or of short duration. The degree of immunity produced is presumably governed by the antigenic value of the vaccine used.

The serum-virus simultaneous method of immunising hounds against distemper is of considerable value, but further experience is necessary before a final estimate of its value can be made, especially with regard to the occurrence of reaction soon after its use and the degree and duration of immunity produced in the field.

Vaccine followed by dried virus is at least 99 per cent. effective as an immunising method for canine distemper.

G. W. DUNKIN.

REMLINGER, P., & BAILLY, J. (1931). Etudes sur la Rage. **[Studies on Rabies].** —*Ann. Inst. Pasteur.* **47.** 608-659. [36 refs.]

The virus of rabies is constantly present in the salivary glands and in the central and peripheral nervous system ; it is sometimes present in the mammary gland, pancreas, suprarenal capsules and aqueous humour, and is occasionally present in the blood. It has not hitherto been demonstrated in the other organs.

Employing different strains of " street virus " and " virus fixe," the authors have investigated the possibility of infection occurring in the spleen, liver and kidneys of various species of animals (dog, cat, rabbit, rat).

The technique consisted of making suspensions of a portion (4-5 g.) of the organ and injecting part of it subdurally into the brain, and inoculating the remainder into the muscles of the neck of a rabbit or guinea pig.

In 12 out of 43 tests (27·9 per cent.), the virus was proved to be present in the spleen ; in six out of 20 experiments (30 per cent.), it was shown to be present in both the liver and the kidneys.

Positive results were not influenced to any great extent by the species of animal (dog, cat, rabbit or guinea pig) inoculated ; the cat gave the highest number—46·66 per cent. Positive results were obtained with virus from naturally affected animals and from animals artificially infected either with " virus fixe " or with " street virus."

In agreement with MANOUELIAN and VIALA, the authors believe that infection of the spleen, liver and kidneys is not attributable to infectivity of the blood which they contain, but that it is the result of the presence of the virus in the nerves and ganglia of the organs.

KOCH [(1929). *Zlb. Bakt. I.* (*Orig.*). **113.** 376-392.] has reported that, in human beings who have died of rabies, the virus may be absent from certain areas of the brain and cord and that, in order to establish a diagnosis, it is advisable to take samples from different areas and to inoculate different species of animals.

Remlinger and Bailly have confirmed KOCH's observation and, using portions of brain and cord from ten cases of rabies in dogs, have obtained six negative results out of a total of 63 inoculations.

They point out that there is not one strain only of " virus fixe," but that there are as many strains as there are anti-rabic Institutes. The importance of this question was appreciated at the First International Conference on Rabies and a resolution was passed recommending a survey of the position. No action has, however, been taken in the matter.

The plurality of strains of " virus fixe " is proved by the protean character of the symptoms exhibited by rabbits during passage of the virus and by the different degrees of pathogenicity, etc. Remlinger and Bailly state that there is probably as much, if not more, variation between the strains of " virus fixe " as between strains of " street virus."

In view of the claims of Isabolinski and Zeitlin that the " virus fixe " passes into the central nervous system during the course of routine Pasteur Institute treatment for rabies, experiments were undertaken to determine the accuracy of these observations. The authors were unable to find any evidence that the virus passed into the central nervous system either during or after vaccination.

Relationship between " Mal de Caderas " of Bovines and Rabies.—Rosenbusch [see this *Bulletin*. **2.** 12.] has recently described a disease of bovines (bovine " mal de caderas ") in Paraguay which, while it resembles the paralytic form of rabies, is said to differ from rabies in certain features ; for example, the disease is confined to Paraguay and to the neighbouring regions, the rat is resistant to infection and Negri bodies are absent.

Remlinger and Bailly have made a detailed study of this virus and the only difference which they could find between it and rabies virus was the relative benignity of naturally acquired bovine " mal de caderas " in which the mortality ranges from 20-60 per cent., whereas clinical rabies in animals always terminates fatally. Animals artificially infected with the virus of bovine " mal de caderas " invariably succumb, the symptoms being those of a typical rabies syndrome.

The authors point out the urgent need for carrying out cross-immunity tests between the virus of Rosenbusch and rabies virus in order that this important question may be quickly and definitely settled.

In dealing with the disease reported by Carini (1911) in the State of Santa Catharina, Brazil, to which Remlinger and Bailly referred in a previous publication [see this *Bulletin*. **2.** 147], these authors now state that on further consideration they are of the opinion that the arguments advanced against the disease being rabies are not conclusive.

A similar epizootic to those already reported has occurred in the State of Parana and has been diagnosed as rabies. It is, therefore, possible that bovine " mal de caderas " in Paraguay, Bolivia and the Argentine, the " peste das cadeiras " in the State of Rio Grande do Sul, and rabies in Santa Catharina and Parana, Brazil, are one and the same disease. If it is admitted, therefore, that bovine " mal de caderas " in Paraguay is the paralytic form of rabies, the same conclusion must be drawn regarding these other infections.

[It is difficult to do justice in an abstract to this long and important memoir and those interested should consult the original.]

T. M. DOYLE.

I. Remlinger, P., Palmowitch, S., & Bailly, J. (1931). Pluralité des virus rabiques fixes. Nocivité de quelques-uns. [**Plurality and Virulence of Certain Strains of Fixed Rabies Virus**].—*C.R. Soc. Biol. Paris*. **107.** 1050-1052.

II. Remlinger, P., Palmowitch, S., & Bailly, J. (1931). Contribution à l'étude de l'action de la dilution sur le virus rabique. [**The Effect of Dilution on Rabies Virus**].—*Ibid.* 1244-1246. [2 refs.]

I. The authors have compared the immunising value of several strains of fixed virus. They recognise three types :—(a) strains which are exclusively paralytic ; (b) strains which are exclusively encephalitic ; and (c) strains of intermediate characteristics. A series of seven dogs vaccinated with an intermediate type, two by the method of Becker-Philipps and five with etherised vaccine, furnished one case of fatal post-vaccinal paralysis. A second series of seven dogs vaccinated in a similar manner with an encephalitic strain gave rise to two cases of fatal paralysis, one in each group. On the other hand, more than 2,000 dogs have been vaccinated with a paralytic strain with but a single post-vaccinal case of paralysis which subsequently recovered. It is concluded that there are certain strains of fixed virus which, when suitably attenuated, are entirely innocuous for the dog, while there are others which, in spite of the same method of attenuation, are still capable of inducing dangerous symptoms.

II. Contrary to the observations of Högyes that the minimal lethal dose of fixed rabies virus for the rabbit is a dilution of 1 in 5,000, the authors have obtained positive results with several strains of fixed virus in a dilution of 1 in 500,000 injected intracerebrally in a dose of 0·5 c.c. ; negative results were invariably obtained with dilutions over 1 in 600,000. They agree with Nitch that there is no delay in the time of death proportional to the degree of dilution, and it is therefore a mistake to consider that simple dilution exerts any attenuating action on the virus. They suggest that the cases of paralysis which occasionally follow treatment with dilute virus should be regarded as a true rabies paralysis, since the preceding experiments clearly show that the Högyes method commences with dilutions which are virulent for the rabbit.

R. E. GLOVER.

Purchase, H. S. (1931). **Experiments on the Viability of the Virus of Fowl Plague under Trade Conditions.**—*Vet. Rec.* **11.** 644-648. 7 tables. [13 refs.]

The author states that the origin of the sporadic outbreaks of fowl plague which occur occasionally in England has not been definitely ascertained, but circumstantial evidence points to infection having been imported with frozen carcasses from countries in which the disease is enzootic.

He carried out experiments to determine the viability of the virus in carcasses stored under trade " chilling " conditions (31° F. to 38° F.). He found that the virus survived for 287 days in the muscle and for 303 days in the bone marrow of fowls killed before the appearance of clinical symptoms.

Although ingestion is the most probable route of infection under natural conditions, Purchase failed to infect fowls by feeding virulent muscle, thus confirming an earlier observation by Lagrange.

T. M. DOYLE.

Gafafer, W. M. (1931). **Upper Respiratory Disease (Common Cold) and the Weather. Baltimore. 1928-1930.**—*Amer. J. Hyg.* **13.** 771-780. 1 table, 4 figs. [5 refs.]

An attempt is made to determine whether any relation exists between the weekly upper respiratory attack rates of a group of volunteers and certain weather conditions. The period of observation extended from October, 1928, to April, 1930, and the author rightly points out that the results of a greater number of years should be studied before definitely accepting any conclusions. The observations were carried out on about 350 medical students and a family group of about 100 families, totalling about 500 individuals. The period of observation was divided up into two cold periods and one warm period and, in the case of the medical students, the observations suggested that, during the cold period, a tendency for the minimum temperature, average temperature, a.m. dry bulb temperature, p.m. dry bulb temperature and vapour pressure to fall below its ordinary level was correlated with a slight tendency for the common cold attack rate to rise. During the summer warm period a fall in any of those weather elements or in percentage sunshine and atmospheric pressure was also correlated with a rise in the common cold attack rate.

There was a difference as regards the family group for no association was apparent between any of the thirteen weather elements studied and the common cold attack rate during the two cold periods. There did appear to be an association and rise in the attack rate in this group during the summer period when any of the following weather elements fell below its ordinary level :—minimum temperature, average temperature, a.m. dry bulb temperature, p.m. dry bulb temperature and percentage sunshine.

Rainfall, wind and humidity appeared to have no association in either group in either period.

R. LOVELL.

HOFFMAN, D. C., PARKER, F., & WALKER, T. T. (1931). **The Effect of Testicle Extract on the Rous Sarcoma.**—*Amer. J. Path.* **7.** 523-532. 2 tables. [14 refs.]

[DURAN-REYNALS. (1931). *J. Exp. Med.* **54.** 493. reported in the testicle of the rat, rabbit and bull the presence of a factor which inhibited the growth of the Brown-Pearce transplantable epithelioma]. The present authors deal with the influence of testicular extract on the growth of the Rous sarcoma in chickens. [This tumour grows from cell-free filtrates].

Rabbit testicular extract enhanced the growth of the Rous sarcoma in chickens, whether tumour mash or cell-free filtrate of the tumour was used in the inoculations. Rooster testicular extract had no such effect and normal rabbit serum caused only a slight degree of enhancement.

In the light of the results obtained by DURAN-REYNALS (1931) who showed that testicular extracts inhibited an epithelioma in the rabbit, contrary to their enhancing effects on virus or bacterial infections, the question naturally arises as to whether this tumour is a true one in the sense of mammalian tumours or is merely the manifestation of a virus disease, an infectious granulomatous process or an enzyme-like substance.

J. R. M. INNES.

KRUEGER, A. P. (1930). **The Sorption of Bacteriophage by Living and Dead Susceptible Bacteria.**—*J. Gen. Physiol.* **14.** 493-516. Reprinted in

Stud. Rockefeller Inst. Med. Res. (1931). **78.** 369-392. 9 tables, 6 figs. [14 refs.]

Existing work on the subject of the interaction between bacteriophage and susceptible organisms tends to lead to the view that bacteriophage is taken up by the bacteria by a process of adsorption. There are, however, no quantitative data which supply adequate support for this view. A fundamental question regarding the interaction of the two factors is the manner in which the interaction takes place.

The present paper deals with observations on the distribution of the bacteria —both living and dead—and the broth in which they are suspended.

The technical details do not lend themselves to abstraction as detail is all important, but the results may be summarised as follows :—

A single strain of staphylococcus and a very active antistaphylococcus bacteriophage were used throughout the tests.

For live organisms not multiplying in broth and for organisms multiplying in an organism-phage mixture, the bacteriophage is distributed in a manner typical of numerous materials which are soluble in both phases of a two phase system.

The combination is quantitatively reversible. With organisms killed by heat, the distribution of the bacteriophage is of the adsorptive type.

Under ordinary conditions dead organisms take up much more bacteriophage than do the living ones. This reaction is not demonstrably reversible and, when the initial ratio of the bacteriophage to the organisms is high, the saturation of the latter may be complete.

No difference in adsorptive capacity is observed in organisms killed at temperatures ranging from 65° to 100° C. and the rate at which bacteriophage is removed from solution does not vary materially.

Determinations of bacteriophage have been found to act satisfactorily as indicators of bacterial growth in mixtures in which the growth is to be maintained at a constant level. Similarly, death of organisms is promptly indicated by a sharp fall in the bacteriophage, for the dead organisms absorb it in an irreversible manner.

A. LESLIE SHEATHER.

DISEASES CAUSED BY METAZOAN PARASITES.

BARTH, Widukind. (1930). Versuche zur Abtötung der Dassellarven beim Rinde. Anwendung von Vaseline, Schmierseife, Flit, Delicia, Dasselstäbchen und anderen antiparasitären Präparaten, sowie das Anstechen der Larven. **[Experiments connected with the Destruction of Warble-fly Larvae in Cattle. The Use of Vaseline, Soft Soap, Flit, Delicia, and other Anti-Parasitic Preparations, and pricking the Larvae]**.—*Inaug. Diss. Hannover.*

The author summarises some of the literature dealing with his subject and concludes that, from the published accounts, several effective remedies are available. He does not appear to have consulted the original papers in some instances, but quotes from abstracts of them appearing in German journals.

Many of the preparations used in the experiments were proprietary articles, the composition of which is not stated.

In his experiments, Barth found that the resistance of third stage and even

second stage larvæ was greater than was reported by KOHTES and by FROMM.

It is possible to kill the larvae under the skin by using vaseline, but the process takes some time, the inunction of nodules for one or two minutes killing only a small proportion of the larvae. Some of the proprietary articles used were effective because they induced an inflammatory condition of the skin.

No experiments appear to have been carried out with English products.

A. LESLIE SHEATHER.

I. LEIPER, R. T. (1931). **Schistosome Worms and Schistosome Monsters.**—*Brit. Med. J.* May 9th. 817.

II. SHEPPARD, R. L. (1931). **Schistosome Worms and Schistosome Monsters.**—*Ibid.* May 23rd. 914.

I. In a letter to the Editor of the *British Medical Journal*, Leiper refers to KHALIL'S *Bibliography of Schistosomiasis* in which is included a paper by EISENBARTH (1908) entitled "Ein Fall von *Schistosoma reflexum*" [A case of *Schistosoma reflexum*] and a paper by NOTTER (1927) entitled "Schistosomen beim Schwein" [Schistosomes in the Pig]. He observes that the *Schistosoma* referred to in these two papers is a particular type of monstrosity fairly common in domestic animals and not to the genus of trematodes. The name was used by GURLT (1832) who applied the methods of zoological nomenclature in classifying the monstrosities of domestic animals.

II. In reply to this letter, Sheppard points out that KHALIL should not be held entirely responsible for the error. The same confusion in the two meanings of this word has previously occurred in the *Index Medicus* (1908), the *Index-Catalogue of the Library of the Surgeon-General's Office, U.S. Army* (1910), the *Quarterly Cumulative Index Medicus* (1927) and in *Biological Abstracts* (1929).

E. L. TAYLOR.

ISOLATO, A. (1931). Di un case di echinococco al cuore. [**A Case of Echinococcus in the Heart**].—*Clin. Vet. Milano.* **54.** 821-823. 1 fig.

The author gives figures and describes a case of echinococcus infestation in a nine weeks' old calf. The organs, other than the heart, were free from parasites; in the heart, 19 cysts of various sizes were detected. Fifteen of these were in the muscular wall of the left ventricle and four in the wall of the right ventricle.

The author raises the question whether, in view of the age of the calf, intrauterine infection was possible.

A. LESLIE SHEATHER.

SMIT, H. J., & NOTOSOEDIRO, R. (1931). *Arduenna strongylina* (**Rudolphi, 1819**).—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 323-327. 1 fig.

The authors give a detailed description and some figures of a worm found in the stomach of a four months' old pig and conclude that it was *Arduenna strongylina*. In the course of their description, they compare the various measurements of the body, or parts of it, with those given by other writers, particularly BAYLIS and HALL. They give their reasons for thinking that the worm occurs

in the Dutch East Indies and is not of recent importation.

A. LESLIE SHEATHER.

SEN, S. K. (1931). **Equine Microfilariasis : A Short Review of the Literature.**—*Ind. J. Vet. Sci. & Anim. Husbandry.* **1.** 143-149. [28 refs.]

Compared with the frequency of their occurrence in dogs, microfilariae are rare in horses, and the author gives a few figures to show the percentage of infected animals in different parts of the world. He concludes, from the varied nature of the accounts of morbid disturbances resulting from microfilariasis, that a large proportion of the recorded cases have actually resulted from other causes.

E. L. TAYLOR.

——. (1931). **Strongylidosis in Equines.** [Report of the Discussion on a paper by THWAITE, J. W.]—*Vet. Rec.* **11.** 567-568.

This is a summary of the discussion on a paper which was presented by Mr. J. W. THWAITE before a meeting of the Western Counties Division of the National Veterinary Medical Association; publication of the paper is, however, withheld for the time being. The following points taken from the discussion are of some interest. Mr. SMYTHE considered that on account of the grass being shorter during the winter, the amount of infective material picked up by horses was probably greater in the winter than in the spring and summer months. This might account for the belief that the best treatment for emaciated horses is to turn them out on seeds by day. He had seen severe outbreaks of strongylidosis in horses which had been fed on hay grown on infested pastures. In practice he had found that there was no fixed ratio between the degree of infestation and the symptoms shown by an infested animal.

Mr. FRASER expressed the opinion that overstocking with horses, and poor feeding, were the chief predisposing causes of the disease.

In the reply, Mr. Thwaite said that it was difficult to understand how infection could be carried by hay as the larvae could not withstand drying for long. He knew, however, that this was possible as the London bus horses, which had no access to green food, used to become infested with strongyles. He thought that the cause of unthriftiness in infested horses was to be found in the changes in the bowel wall which interfered with assimilation as a reaction area, which might be 20 times the size of the larva, occurred around each larva so that, when these are present in very large numbers, there must be great interference with the normal functions of the bowel wall.

E. L. TAYLOR.

VAJDA, T. (1931). Ein rasches Verfahren zur Feststellung der Lungenwurmkrankheit der Schafe. [**A Rapid Method for the Diagnosis of Verminous Bronchitis in Sheep**].—*Tierärztl. Rdsch.* **37.** 778-780. 3 figs. [15 refs.]

There are several useful laboratory methods for the concentration of the eggs and larvae of nematodes in the fæces, but most of them require special apparatus and take more time than the practitioner can afford to give. The author describes a simple method, particularly useful for the detection of lungworms, which may prove very useful to field workers and practitioners. It is

based on the observation that lungworm larvae will readily leave the fæces to enter water with which they are in contact. Where the fæces are of normal consistency, individual pellets from each sample are placed on a microscope slide in three to five drops of water and are allowed to stand there for 15 minutes or longer. The pellets are then removed by means of a pair of forceps and the perfectly clear underlying water is examined for larvae, which are principally found at the edges of the drop of water. It is important not to injure the fæcal pellet as otherwise the water enters it and the larvae do not leave so readily. In heavily infected cases, two or three seconds are sufficient for the larvae of *Dictyocaulus* to show themselves in the water.

When the fæces are soft, sufficient water is mixed to render them conveniently plastic ; a petri dish is then filled and, by means of a button-ended glass rod and cotton wool plug, small holes are made so that the glass bottom of the petri dish clearly shows for a diameter of about 1·5 cm. These holes are filled with water into which the larvae pass, where they may be examined under the microscope.

The advantages claimed for this method are that it is simple and quick. Where the larvae of *Dictyocaulus* are concerned, a hand lens will provide sufficient magnification and 80 to 100 examinations can be carried out in an hour. The larvae of *Synthetocaulus*, being less active, do not enter the water so readily and do not appear in any numbers for 15 minutes. Where it is desirable to collect a number of larvae, the method as adapted to soft fæces is used, the water being afterwards drawn off by means of a pipette and centrifugalised.

In examining for lungworm larvae it is essential that the fæces should be perfectly fresh, but even then the larvae of *Strongyloides* are sometimes present. They may easily be distinguished, however, from lungworm larvae, and the larvae of other intestinal nematodes do not appear to complicate the examination for 18 to 24 hours.

Those who experience difficulty in distinguishing between *Dictyocaulus* and *Synthetocalus* larvae may use a 1 per cent solution of methylene blue instead of water as, of all the larvae which may be found, those of *Dictyocaulus* are the only ones which will become stained.

E. L. TAYLOR.

——. (1931). **The Kidney-Worm of Swine : *Stephanurus dentatus*.**—*J. Helminth.* **9.** 179-190. Notes and Memoranda No. 3., Imperial Bureau of Agricultural Parasitology. [96 refs.]

II. Schwartz, B. (1931). **Nodular Worm Infestation of Domestic Swine.**—*Vet. Med.* **24.** 411-415. 2 figs. [9 refs.]

I. This concise review of the literature on *Stephanurus dentatus* summarises the several aspects of our present knowledge of this parasite. *S. dentatus* is now known to be widespread in tropical and subtropical countries and, although hitherto regarded as absent from Europe, it has recently been found in Granada in Spain.

Various organs have been recorded as the seat of infection, but the liver is now regarded as the normal seat for immature forms and the connective tissue surrounding the kidneys for mature forms. The worm has been found in the ox and the ass as well as in the pig.

The review gives a short account of the morphology of the species and of what is known of the life history. The larvae, which under optimum conditions develop to the infective stage in less than a week, appear to be able to enter the body either

through the mouth or by penetrating the skin. Growth proceeds in the liver for five or six months before the young worms migrate and it is during this period that the pathogenic action is most severe.

At the present time no means of control are known other than the application of hygienic measures to prevent contact with infective larvae.

II. In 1930, MAPLESTONE recorded two new species of nodular worms in swine, naming them *Oesophagostomum suis* and *O. conicum*. The first of these, *O. suis*, appears to be identical with *O. brevicaudum* described by SCHWARTZ and ALICATA in 1930, [see this *Bulletin*. **1.** 58.] but the second species, *O. conicum*, is undoubtedly new. As, however, this combination has previously been employed by MOLIN (1861) the name cannot again be used and it is here proposed to replace it by the name *O. maplestoni*.

Prior to 1925 it was believed that only one species of *Oesophagostomum* existed in swine, but there are now known to be five. Four of these have been found in the United States, but so far *O. dentatum* is the only one known to occur in Europe. In working with this parasite, GOODEY was impressed by the fact that no nodules such as occur in connection with *Oesophagostomum* infestation in sheep and cattle were produced. The present author, however, constantly finds nodules of the size of a pin's head in the mucosa of the large intestine in all infestations of *O. dentatum*, a fair proportion of which contains larvae in the third or fourth stage of development. In the southern part of the United States, relatively large nodules surrounded by an inflammatory zone are also observed. These nearly always contain œsophagostome larvae, which may occasionally be seen protruding through an opening in the wall of the nodule. In a few instances decidedly enlarged and ulcerated nodules are seen. These contain no larvae.

A possible explanation of the fact that large nodules are found only in the southern part of the United States is that *O. longicaudum*, which is rare in the vicinity of Washington, is of common occurrence in the south. A morphological study of the fourth stage larvae from each kind of nodule supports this view, but, in the present state of our knowledge of the development of these worms, it is not possible to make a specific determination on the fourth stage larvae alone.

These worms must now be regarded as harmful to swine as the penetration of the larvae into the mucous membrane of the intestine is occasionally followed by ulcer formation.

E. L. TAYLOR.

DISEASES, GENERAL.

PAQUET. (1931). Rôle des saisons et des pluies dans l'évolution de certaines maladies contagieuses. **[The Connection between Seasons and Rains and the Incidence of certain Contagious Diseases]**.—*Bull. Acad. Méd.* **105.** 658-666.

The records of the Oise district (about 400,000 inhabitants) for contagious diseases and for weather during the period 1911 to 1930 have been examined in order to see if there is any correlation between the two sets of data. Evidence suggests that outbreaks of typhoid fever are definitely associated with the weather as this disease is more common in dry years than in wet ones, but it is especially evident when heavy rains follow a dry period. Scarlet fever recurs annually; it is always at its maximum in spring and outbreaks seem to be associated with wet periods. Measles is also associated with wet periods, but outbreaks recur every

two or three years and are usually at their height in May. Diphtheria outbreaks are greatest in winter and are associated with heavy and continual rains. This disease reappears every four or five years, but each outbreak usually lasts two years. The death rate from tuberculosis is greatest in May and is always higher in wet years than in dry ones.

W. R. WOOLDRIDGE.

HAHN, W. (1931). Die Zähne als Eingangspforte für Krankheitserreger (Oralsepsis). [**The Teeth as Portals of Entry for Pathogenic Organisms (Oralsepsis)**].—*Berl. tierärztl. Wschr.* **47.** 453-459; 469-473. [50 refs.]

This is a detailed paper on the question of whether generalised toxæmia resulting from a local infective nucleus in the mouth occurs in domestic animals as it does in man.

For the purpose of forming a basis for discussion from the veterinary point of view, the author first discusses in some detail the facts at present known about this condition in man. He then gives instances of mouth lesions which accompany or follow certain animal diseases (foot and mouth disease, Stuttgart disease of dogs, etc.) and of generalised disorders that are observed in association with disease conditions of the mouth, pharynx, etc. in animals (e.g. " rheumatic " conditions following pharyngitis and purpura hæmorrhagica following strangles). A tonsillitis in pigs is often observed in association with anthrax, erysipelas, etc. It is well known that, especially in horses, tooth sepsis (alveolar periostitis, etc.) may lead to septic infection in other parts of the head, but it has not yet been established whether such secondary effects extend beyond the head to the body and viscera. Such extension may proceed by way of the lymphatic system, the blood stream, the alimentary tract or by the respiratory tract.

A description of the lymphatic system of the head of the horse as worked out by BAUM and others is given in order to indicate the probable progress of infection from any given part of the head. SCHWEITZER (1907) and SOLKOWER (1927) have worked out the anatomy of the lymphatic channels in the teeth and jaws.

In his original research into the question under review, the author examined 20 horses with local infection in the head (16 tooth infection cases). He compared the state of the teeth with the blood picture and found that there were marked and characteristic changes in the latter in animals showing oral sepsis. These changes indicated the presence of irritation of the lymphatic and reticulo-endothelial systems manifested by a lymphocytosis and monocytosis and the presence of immature and abnormal cells in the blood.

In many cases the blood picture became normal again after the local condition had been cured. Although the author does not claim to have demonstrated that oral sepsis causes systemic disease in the horse, this work provides valuable material on the subject.

J. T. E.

PANISSET, L. (1931). Les idées actuelles sur les maladies rouges du porc. [**Present State of Knowledge of the " Red " Diseases of Swine**].—*Rec. Méd. vét.* **107.** 713-729. [14 refs.]

This article, an address given in the course of the " Journées vétérinaires d'Alfort " in June, 1931, deals principally with swine fever, including its control by serum-therapy or by vaccination.

The opinion which is held by some authorities that contagious pneumonia and contagious enteritis are not distinct pathological conditions, but are merely secondary infections by *B. suisepticus* and *B. suipestifer* respectively, superimposed upon infection by the virus of swine fever, is supported by the mild type of virus disease which commonly exists in France and which is masked by the presence of one or other secondary invader or of both (pneumo-enteritis).

The author recommends that, in France, local virus should be used in vaccination against swine fever in preference to an active laboratory virus, on account of the risk of setting up a more virulent form of the disease in the field.

D. A. E. C.

PORCHER, Ch. (1931). L'infection latente de la mamelle et ses réveils. Les moyens de la dépister. [**Latent Infection of the Udder and its Exacerbations. Methods of Detection**].—*Rec. Méd. vét.* **107.** 656-687.

The author refers to the severe financial loss caused by disease of the bovine udder, much of which is of an insidious nature. He records various statistics showing that latent streptococcic infection exists in 10-20 per cent. of animals in small herds and up to 60 per cent. or more in larger herds.

The origin and course of latent infection are discussed and followed by a review of the associated changes and of the methods which have been evolved for its detection. These include measurements of pH, chloride content and catalase, the proportion of sediment obtained by centrifuging and its character, microscopic examination for total and differential leucocyte estimation and for bacteria, and finally cultural methods. The author considers anything which interrupts normal lactation as predisposing to an exacerbation of a latent condition ; he mentions the usual method of terminating lactation, fevers and particularly foot and mouth disease. Frequent stripping is regarded as of value in treatment.

In conclusion the author pleads for an extended use of the means which we now possess for the detection of latent infection of the udder and the adoption of official measures for its control.

A. W. STABLEFORTH.

SCHUSTER, Norah. (1931). **Pulmonary Asbestosis in a Dog.**—*J. Path. Bact.* **34.** 751-757. 2 figs. on one plate. [30 refs.]

The author describes an unusual and rare case of pulmonary asbestosis in the lungs of a dog. The animal was ten years old and had lived in an asbestos factory nearly all his life. During the last two years there was a history of cough and dyspnœa and, for the six months previous to death, progressive wasting.

The lung lesions are described and illustrated, the main features being :— (1) increase in the interstitial tissue, cellular and fibrous ; (2) dilatation of the bronchioles and terminations, and (3) the presence of numerous asbestos spicules which were mostly situated in the interstitial tissue. There was no evidence of septic infection, consolidation, bronchitis or tuberculosis of the lung and no traces of asbestos " bodies " were found. The fibrosis is suggested to be the result of the toxic action of the asbestos, a combined silicate, and not a mechanical effect.

These pathological changes are in close agreement with the classic descriptions in man, but the absence of septic infection and asbestos " bodies " is noteworthy.

Human beings average seven to ten years exposure before symptoms begin.

J. R. M. INNES.

STEPHENSON, H. (1931). **Pyometra in Bitches.**—*Rep. New York State Vet. Coll. for 1929-30.* pp. 137-141. Albany: J. B. Lyon Company.

This is a practical description of pyometra in bitches. It contains no new information, but is a good summary of up-to-date knowledge of the condition.

J. T. E.

DOBROVOLSKAÏA-ZAVADSKAÏA, N. (1931). La fréquence des cancers chez les Souris procrées par des mères cancéreuses. [**The Incidence of Cancer in Mice bred from Cancerous Mothers**].—*C.R. Soc. Biol. Paris.* **107.** 466-469. 1 table. [2 refs.]

Five litters of mice were taken, all from cancerous mothers which had suffered from mammary adenocarcinoma; in two of these litters the father was a son of a cancerous mother. Out of a total of 93 males and 84 females, 4·3 per cent. and 66·7 per cent. respectively had cancer, the most frequent type being adenocarcinoma. The mice were bred until the third generation.

In the author's opinion, the variation in the percentage in the different litters can be related to recessive characters and the facts observed are in accordance with the hypothesis that, although they do not suffer from breast adenocarcinoma, males can behave as homozygotes.

J. R. M. INNES.

SUGIURA, K. (1931). **The Influence of Extracts of Suprarenal Cortex on the Growth of Carcinoma, Sarcoma and Melanoma in Animals.**—*Amer. J. Cancer.* **15.** 129-143. 5 tables. [16 refs.]

SUGIURA, K. (1931). **Further Studies on the Influence of an Aqueous Extract of the Suprarenal Cortex on the Growth of Carcinoma, Sarcoma and Melanoma in Animals**].—*Ibid.* 707-724. 5 tables, 5 text figs. [6 refs.]

In a previous paper by SUGIURA and BENEDICT (1930), it was shown that the development of small malignant tumours in animals was completely inhibited by repeated intratumoral injections of suprarenalin, but that repeated subcutaneous injections at a point distant from the tumour failed to show any inhibiting influence upon the growth of carcinoma and sarcoma. The destructive action of the suprarenalin was due to its vasoconstrictive power. The first paper deals with the influence of various extracts of suprarenal cortex on the development of transplanted tumours in rats, mice and chickens. The technique of preparation of the extracts is given.

The action of the various extracts on the Flexner-Jobling rat carcinoma, the Sugiura rat sarcoma, the Bashford mouse carcinoma No. 63, a transplantable mouse melanoma and the Rous chicken sarcoma, are summarised as follows:—single or repeated subcutaneous or intra-muscular injections of alcoholic, ether, aqueous, or glycerol extracts of the cortical tissues had no influence on the growth of transplanted tumours. Injection of choline solution or feeding with sodium

nitrate similarly gave negative results. (These chemicals cause a prompt fall in the blood pressure.) Extracts from the adenomatous growths of sheep suprarenal glands, which were almost free from medullary tissue, produced no effect upon neoplastic growth. Fresh sheep suprarenal cortex or its extract gave similar results with cancer cells *in vitro*. Repeated subcutaneous injection of extracts of the suprarenal glands of sheep, of immune and normal young rats and of suckling rats, did not affect the growth of rat and mouse carcinomas.

The second paper deals with similar experiments carried out under the same conditions with an aqueous extract of sheep suprarenal cortex prepared according to the method of COFFEY and HUMBER (1930). Negative results were also obtained using the same transplantable tumours and, in addition, it was shown that the extract did not have any inhibitory effect on the growth of spontaneous mammary carcinomas of mice.

J. R. M. INNES.

—. (1931). **Occupational Dust Diseases.**—*Bull. Hyg.* **6.** 663-670. 3 tables, 4 figs. [29 refs.]

An excellent review of diseases caused by the inhalation of dusts generated during the progress of work. Dusts are divided for the purpose into organic and inorganic, and are then sub-divided, the former into viable and dead, the latter into soluble and insoluble.

Among the infectious diseases originated by inhalation of microbes and moulds, mention is made of pulmonary anthrax in wool sorters, and pulmonary mycosis due probably to a type of aspergillus.

Under the heading of " Dead Dust," asthma is dealt with and it is stated that operatives exposed to certain dusts suffer in excess from true asthma ; this appears to be especially so among cotton strippers who are exposed to dust from cotton husk and debris.

Dusts from such materials as basic slag and emery are insoluble and in time inhalation may damage the respiratory mucosa with the result that microbic invasion sets in and bronchitis or pneumonia may develop.

Of the soluble and harmful inorganic dusts, the effect of the silicate asbestos is dealt with and the subsequent condition of asbestosis, which does not appear to predispose to pulmonary tuberculosis.

In connection with anthracosis, attention is drawn to the fact that no undue mortality from respiratory disease is found among coal miners so long as the coal worked contains little or no mineral matter. If pulmonary fibrosis is present, however, the coal particles are not removed fast enough and they accumulate and block up the lymph channels ; this condition is expressed by mortality from bronchitis and, to a lesser extent, from pneumonia and respiratory tuberculosis.

[Readers interested should consult the original article which is itself condensed and has a valuable list of references.]

R. LOVELL.

ORR, J. B. (1931). **The Development of the Science of Nutrition in Relation to Disease.**—*Brit. Med. J.* May 23rd. 883-886.

MELLANBY, E. (1931). **Diet and Health.**—*Ibid.* March 21st. 85-92 of Supplement. [The Hastings Popular Lecture].

—. (1931). **Diet and the Teeth.**—*Ibid.* 502-503.

—. (1931). **Diet and Infection.**—*Lancet.* **220.** 766.

The two original papers are review articles presenting a bird's-eye view of modern work and problems concerning the relation of diet to health and disease. The two annotations refer to Mellanby's lecture, the first emphasising his remarks upon the relation of diet to dental caries and *pyorrhœa alveolaris* and referring to the work of Mrs. May Mellanby [(1930). "Diet and Teeth."—*Medical Research Council. Sp. Rep. Series. No. 153.* London: H.M. Stat. Office.] upon the manner in which disease of the teeth in animals and man is influenced by dietary factors; the second comparing the results of observations on animals subjected to deficient dietaries with those of the "closed epidemic" type of experiment recorded by Topley, Greenwood and Wilson [see this *Bulletin.* **1.** 165].

Since both of the original papers cover a wide range of investigations, the present notice cannot abstract them but can only indicate their nature.

Mellanby emphasises a modern view of dietetics—the prevention of illness by feeding. From observational investigations on the human subject under varying dietary conditions he draws the conclusion that in early life diet is of paramount importance, exceeding even considerations of general hygiene, and that certain foods are responsible for nutritional excellence. He discusses the methods of testing dietaries by animal experimentation, the importance of vitamin D for the formation of bones and teeth in early life, the necessity for vitamin B in subsequent prevention of pyorrhœa, the significance of iodine in early life, the treatment of disease by diet, the influence of diet upon the resistance of the body to bacterial infection, and various allied topics. Without dealing with the political problems involved, he points out that "it is obvious that many problems of social economics are involved in seeing that every member of the community, at least in early life, gets properly fed . . . to take one example, the care of the teeth . . . costs the country millions of public money annually . . . . probably an expenditure of a few thousand pounds would provide yearly sufficient vitamin D to ensure the perfect formation of the teeth of every member of the community if given from birth."

In the paper by Orr, the angle of vision is somewhat different and the subject matter even wider, but the tenor of the argument is the same—the need for attention to nutrition in control of disease. He begins with the history of nutritional research in the past, pointing out that the main feature of the work of the present century has been the shift of the centre of interest from quantity to quality. He then discusses the results of modern investigations, the relation between diet and susceptibility to infection, between diet, blood-composition and immunological reactions, between diet and the flora in different areas of the body; discusses diet in relation to the human being in health and disease, and dietary deficiencies in relation to the welfare of domesticated animals of economic importance.

It is on this last point that contacts are effected with the veterinarian, and his concluding paragraph makes the connection clear:—

"Future advances in the study of nutrition as applied to human medicine will undoubtedly be made through team work, especially of biochemist, immunologist, and clinician. An essential feature of such work should be the coördination of research on the larger domesticated animals with that on human beings. The main problems are essentially the same in both fields and, indeed, some of the diseases on which work is urgently required are common to man and the higher mammals. For example, osteoarthritis is as common in the horse as in man, and simple goitre appears to occur in all mammals, in certain areas where its distribution is coincident with that of endemic goitre in the human population. The nutritional factor in resistance to tuberculosis, which is now recognised as being of importance in human medicine, is equally important in the dairy cow.

"It is to be hoped that, in the future, in those comprehensive studies which are initiated or supported by the State, there will be coöperation, not only between individual workers

in different branches of science, but also between medical and veterinary research institutions and organisations."

H. H. GREEN.

VELU, H., & BALOZET, L. (1931). Reproduction expérimentale chez le mouton de la dystrophie dentaire des animaux des zones phosphatées. **[Experimental Production in Sheep of the Dental Dystrophy of Animals in Phosphate Regions].**—*Bull. Acad. vét. de France.* **4.** 373-376. [6 refs.]

This paper deals with the experimental production of certain defects in the permanent teeth of sheep by feeding them over a prolonged period with extra phosphate in addition to their natural diet (3 per cent. of the ration for two years). The condition under observation is similar to the dental trouble observed in animals in certain regions of Morocco and known locally as " Darmous."

The changes first appear as a yellow discoloration of the enamel, followed by erosion of the surface, and this gradually increases in severity until the whole enamel surface is roughened and eroded. Eruption of the permanent teeth is retarded.

J. R. M. INNES.

I. ACKERT, J. E., MCILVAINE, Marian F., & CRAWFORD, Naomi Z. (1931). **Resistance of Chickens to Parasitism Affected by Vitamin A.**—*Amer. J. Hyg.* **13.** 320-336. 4 tables. [19 refs.]

II. ACKERT, J. E., & NOLF, L. O. (1931). **Resistance of Chickens to Parasitism Affected by Vitamin B.**—*Ibid.* 337-344. 1 table. [7 refs.]

I. It has previously been shown by ACKERT and HERRICK (1928) that chickens which are parasitised by *Ascaridia lineata* eliminate their infection in a few months. ACKERT (1927) also observed that chickens kept on farms are more susceptible to infestation by these worms than are those reared in confinement on a well regulated diet, and it was suspected that the reason might lie in the scarcity of green food on the poultry farms concerned and in a resultant deficiency of vitamin A. The experiments here recorded were, therefore, arranged to ascertain what part might be played by vitamin A deficiency in lowering the natural resistance of chickens to this worm.

The chickens used in these experiments were specially reared, being fed on a normal full diet up to seven weeks old and kept worm free. Three groups of these chicks were used in each experiment :—group 1 received a semi-synthetic diet deficient in vitamin A ; group 2 received the same diet, but with the addition of cod liver oil, and group 3 received a normal full diet.

After two weeks on these diets a dose of the infective eggs of *A. lineata* was given, the number of eggs being varied in the different experiments. At the end of three weeks of parasitism the chickens were killed and examined, and the worms collected from the intestine were counted and measured.

Four experiments were carried out : in the first experiment ten nine weeks' old chickens, from each of the three food groups, received 500 eggs ; in the second experiment the same dose of eggs was repeated on six weeks' old chickens ; in the third experiment the infective dose was reduced to 200 eggs and, in the fourth experiment in which 15 eight weeks old chicks were used for each of the three groups, the infective dose was still further reduced to 50 infective eggs.

The results are presented in the paper in the form of three tables which show that, in the first three experiments, more worms developed and that they were of a slightly larger size in chickens of group 1 (receiving the diet deficient in vitamin A) than in the other two groups, and that the chicks in group 3 (on the normal diet) were the most resistant to infection.

The conditions were slightly altered for the fourth experiment by the increase of the vitamin B and supplementary protein allowance to groups 1 and 2, and by the *Ascaridia* eggs being given after only one week of the experimental feed, instead of after two weeks as in the three previous experiments. Judging by the numbers of worms recovered the results were reversed, the birds of group 3 containing more worms than those of group 1, but the authors point out that the worms in group 1 were of a greater size. They conclude that the resistance of growing chickens, four to seven weeks old, to *A. lineata* is lowered when they are maintained for a further five weeks on a diet deficient in vitamin A, and as one of the results of this deficiency is a weakened peristalsis they suggest that this may be a simple explanation for the results obtained.

II. This paper gives an account of the principal results obtained in a series of experiments, which are a continuation of the work carried out by ZIMMERMAN, VINCENT and ACKERT in 1926.

The chicks used in this work were reared on a normal diet until they were seven weeks' old, precautions being taken to keep them free from worm infection. At that age they were divided into three groups, group 1 receiving a semi-synthetic diet deficient in the vitamin B complex, group 2 the same diet but with the addition of yeast, and group 3 a normal diet. At the age of nine weeks, each chick was given a dose of 500 embryonated eggs of *Ascaridia lineata* ; at the age of 12 weeks the chicks were killed and the worms were collected from the intestine, note being made of the numbers present and of their various lengths. Three series of experiments were carried out in a similar manner, 45 chicks being divided equally into three groups for each experiment.

The results obtained show that group 1 carried an average of 13·43 worms per chick, group 2 an average of 5·28 worms, and group 3 an average of 4·41 worms. The mean length of the worms in group 1 was 13·38 mm., in group 2 18·28 mm. and in group 3 13·80 mm. Many of the chicks in the vitamin B deficient group began to show signs of polyneuritis and to suffer from a partial paralysis of the digestive tract, and the authors suggest that the larger number of worms present in that group may be explained by the assistance to remain in their natural habitat which the worms received on account of the paralytic condition of the digestive tract.

It is suggested as an explanation for the larger size of the worms carried by the chicks which received yeast in the diet that some factor may be contained in that substance which is favourable to the growth of the worms.

E. L. TAYLOR.

IMMUNITY.

COCA, A. F. (1931). **Note concerning Differences between the Clumping of Pseudoagglutination and that of Isoagglutination.**—*J. Immunol.* **20.** 263. 4 figs.

BOXWELL, W., & BIGGER, J. W. (1931). **Autohæmagglutination.**—*J. Path. Bact.* **34.** 407-417. [41 refs.]

Coca's communication is a protest against a statement made by J. A. KENNEDY in an article on isohæmagglutination published in an earlier number of the same journal. KENNEDY had stated that the first observer of isohæmagglutination was SHATTOCK [(1899) *Trans. Path. Soc. London*] and, in support of this statement, quoted passages and reproduced photographs from SHATTOCK's communication. Coca illustrates the differences between pseudo-agglutination and iso-agglutination by four photographs and states that the two photographs of pseudo-agglutination are accurately comparable to SHATTOCK's illustrations.

The communication by Boxwell and Bigger is in three parts, the first part being a clinical history of a case of autohæmagglutination ; the second part is a review of the literature on the subject ; the third part gives details of the hæmatological findings in the case described.

The following definition of autohæmagglutination is suggested by Bigger. " Autohæmagglutination is a clumping of erythrocytes into irregular masses, visible to the naked eye, occurring in the presence of the individual's own serum, without bacterial action at air temperature and reversible at body temperature." This definition has been framed to exclude three conditions which may give rise to confusion, *viz.* :—(1) pseudo-agglutination which is excessive rouleaux formation ; (2) panagglutination which means the agglutination observed when cells and serum are kept mixed at 0° C. for some time, and (3) the Thomsen phenomenon which depends on the action of certain bacteria, or filtrates of broth cultures of these bacteria on the erythrocytes, so that the cells become agglutinable by the homologous serum. Bigger suggests that auto-agglutination, panagglutination and the Thomsen phenomenon are all primarily due to the interaction of the same agglutinin and agglutinogen. Pseudo-agglutination appears to be a distinct phenomenon and not due to a specific antibody-antigen combination.

References to the occurrence of auto-agglutination in animals are given. It has been noted in normal horses, rabbits, fowls, dogs, guinea pigs, cattle, goats, monkeys, donkeys and cats. It has been found to occur commonly in any animal infected with trypanosomes and in rats infected with spirochætes. It is described as very common in cases of human trypanosomiasis.

A careful examination of the literature has revealed only 22 cases which appear to be true cases of auto-agglutination. The clinical details given in these 22 cases suggest that, while autohæmagglutination may occur in normal health, anæmia and abnormality of liver function tend to render it more obvious.

The patient described in the present communication showed signs of jaundice, anæmia and atypical leukæmia. When a blood count was attempted, it was found that the blood would not mix into the diluting fluid, but formed a coarse granular precipitate. On slides the blood would not spread, but made a coarse granular smear ; it did not coagulate any more rapidly than usual, but formed a transparent jelly above the agglutinated red cells. On account of this, it was impossible to make any examination of the blood using ordinary technique, but by using a warm syringe, warm citrate solution and warmed tubes, satisfactory samples of serum and cells were obtained. The cells did not agglutinate when tested against sera of the four normal groups and therefore the patient's blood belonged to the O (Moss IV) group.

When tested at room temperature, the serum agglutinated cells belonging to the four normal groups, but at 37° C. it agglutinated cells of AB, A and B groups, but not O group cells or cells from the patient. The titre of the serum was low, but pseudo-agglutination was excluded as agglutination occurred in dilutions above 1 in 6. By alternate cooling and warming, agglutination or uniform suspension of the patient's cells in patient's serum could be produced indefinitely ;

the degree of clumping or of setting free of the cells was directly proportional to the temperature of the mixture.

The auto-agglutinin could be removed from the serum by absorbing with cells of the patient or by O cells. The patient's serum had no effect on the cells of rabbits and guinea pigs. Heating for 20 minutes at 55° C. had no effect. Hæmolysis of cells was never noted.

Examination of four of the patient's brothers and of his sister did not disclose any evidence that the condition was familial. Bigger points out that blood transfusion is not contra-indicated when this condition is present in a patient, provided that precautions are taken to prevent chilling of the transfused blood.

C. McG.

Hamedy, A. (1931). Le phénomène de l'iso-agglutination chez les chevaux avant et après leur hyperimmunisation antitoxique. [**The Phenomenon of Iso-Agglutination in Horses before and after Antitoxic Hyperimmunisation**].—*C.R. Soc. Biol. Paris.* **106.** 1095-1097. 2 tables.

Hamedy, A. (1931). Le phénomène d'iso-agglutination chez les chevaux producteurs de sérum antitoxique. [**The Phenomenon of Iso-Agglutination in Horses which are producing Antitoxic Sera**].—*Ibid.* 1097-1099. 2 tables.

Earlier authors have demonstrated the existence in horses of blood groups analogous to those found in man. Hamedy has confirmed this observation and has found the percentages of the four groups to be as follows :—group AB, 45 per cent. ; group A, 36 per cent. ; group B, 15 per cent. and group O, 4 per cent. He examined the blood of 33 horses before and after immunisation with anatoxin and found that the blood grouping in the sera of some horses had changed after immunisation. Sera belonging to groups A and B appeared least stable ; group AB sera were fairly stable and group O sera remained unchanged. He could perceive no significance in these changes and concluded that there was no relationship between the antitoxin content of a serum and the blood-grouping.

C. McG.

Lauer, A. (1930). Blutgruppendifferenzierung bei Hunden. [**Blood Group Differentiation in Dogs**].—*Zeitschr. Immun. Forsch.* **68.** 433-435. 2 tables. [5 refs.]

The blood of 40 dogs was examined in relation to the existence of blood groups. All the canine sera agglutinated human group O blood corpuscles, and human group AB sera agglutinated canine blood corpuscles. The collective canine serum was shown to possess a B receptor with regard to human blood. Canine blood was found to resemble most closely the Bα human blood group.

J. T. E.

Witebsky, E. (1931). Die Bedeutung der Wiedergewinnung von Antikörper aus ihrer Antigenverbindung für serologische Probleme. [**The Significance of Recovery of Antibodies from their Combination with Antigens in Serological Problems**].—*Zlb. Bakt. I.* (*Orig.*). **122.** 70-73.

In this report, which has special reference to the so-called lipoid antibodies,

the author states that by means of experiments designed to recover antibody from an antigen-antibody complex, he was able to distinguish specific and non-specific flocculation.

The sera investigated included those containing Forssmann's heterogenetic antibody or an organ specific brain antibody, both of which were taken as indisputable lipoid antibodies ; those obtained by immunising rabbits by the combined method of Sachs, Klopstock and Weil ; sera from normal rabbits which gave flocculation of a definitely non-specific character ; Wasserman + sera, and so-called labile sera of human origin which gave a non-specific reaction.

Sera were mixed with suitable alcoholic extracts under such conditions that marked flocculation occurred. After long incubation or refrigeration, the precipitate obtained by centrifuging was washed several times, resuspended in saline and placed at 56° C. [Time not given.] Then, whilst still hot, the suspension was centrifuged at high speed.

From the mixtures containing normal rabbit serum and the " labile " sera, nothing was recovered ; from those containing the remaining sera antibody was recovered in an amount nearly equal to that originally present. [Details are not given.]

A. W. STABLEFORTH.

Ramon, G., & Lemétayer, E. (1931). Sur l'aptitude à la production de l'antitoxine tétanique de chevaux antérieurement vaccinés contre le tétanos. [**The Capacity of Previously Vaccinated Horses for the production of Tetanus Antitoxin**].—*C.R. Soc. Biol. Paris.* **106.** 21-23. [2 refs.]

Ramon, G., & Lemétayer, E. (1931). Sur une méthode de production intensive de l'antitoxine tétanique. [**A Method of Intensive Tetanus Antitoxin Production**].—*Ibid.* 23-25. [5 refs.]

Ramon, G., & Lemétayer, E. (1931). A propos de l'augmentation de production de l'antitoxine tétanique par addition à l'antigène de substances non-spécifiques. [**The Augmentation of Tetanus Antitoxin Production by the Addition of Non-Specific Substances to the Antigen**].—*Ibid.* 71-74. [5 refs.]

Ramon, G., & Lemétayer, E. (1931). Sur l'aptitude à la production de l'antitoxine tétanique de chevaux antérieurement vaccinés contre le tétanos. [**The Capacity of Previously Vaccinated Horses to produce Tetanus Antitoxin**].—*Presse méd.* **40.** 78.

A " reviving " dose of 10 c.c. of anatoxin and tapioca, given to horses vaccinated a year previously against tetanus, multiplied the serum unit content from 1,000 to 20,000 times. This is, therefore, a valuable method of obtaining a solid immunity and shows the capacity of previously vaccinated horses for bulk antitoxin production.

The mixing of tapioca with antigenic materials is of economic value in that less antigen is required, less time is taken and greater concentration is possible, thus decreasing the volume of material injected in antitetanic treatment. Fifteen horses that had received 1,500 c.c. of antigen over a period of one month, produced an average serum value of 4,800 international units—a record.

The non-specific substances, tapioca, potash alum and calcium chloride, were tested out as adjuncts to tetanus antigen. When fresh horses were used, tapioca was found to have the greatest augmentary effect, followed by calcium

chloride and alum, but very little difference between the effects of the substances was noted when previously vaccinated horses were tested. The reaction provoked by the alum was very severe, that by the tapioca less so, and the least effect was produced by calcium chloride.

NORMAN HOLE.

HENRY, F. X. (1931). Malaria-flocculation ; les antigénes ; l'observation macroscopique des résultats. [**Flocculation Test for Malaria ; the Antigens ; Reading of Results**].—*C.R. Soc. Biol. Paris.* **107.** 1520-1522.

This communication is a short discussion on the reagents and technique used in the flocculation test for malaria. The author recommends the use of iron albuminate (Merck) as antigen and advises titration against known malarial and healthy sera. He also advises the use of doubly distilled water in the preparation of reagents.

C. McG.

BERTHELSEN, K. C. (1931). **Studies of the Flocculation-Reaction Time in the Course of Immunisation and the Quantitative and Qualitative Changes of the Proteins.**—*J. Immunol.* **21.** 43-67. 5 tables. 9 figs. [36 refs.]

Changes in various properties of the serum of horses immunised with diphtheria toxin have been examined over the whole period of immunisation. Toxins prepared in different ways were used and the blood of the immunised horses was examined at weekly intervals, at least 48 hours after injection of the toxin. The properties examined were the flocculation-reaction time, the antitoxic titre, the total protein content and the variations in the different protein fractions (albumin, euglobulin and pseudoglobulin), viscosity, surface tension, ash content and change in volume of the erythrocytes. The flocculation-reaction time consistently increased with individual horses over the whole period of immunisation. A few horses showed a slow decrease after a period of increase whilst two horses showed a rapid reaction time which remained constant over a long period. These changes could not be definitely correlated quantitatively with any of the protein fractions, nor with the total globulin. The total protein values agreed better. Variations are shown to exist in the viscosity and surface tension but these showed no relationship to the flocculation-reaction time. No significant variations in the total inorganic substances (ash) nor in the volume of the erythrocytes were observed. It is concluded that the increase in flocculation-reaction time must be due to qualitative changes in the protein fraction of the serum although none has so far been demonstrated.

W. R. WOOLDRIDGE.

PECK, S. M., & SOBOTKA, H. (1931). **Production of a Refractory State as Concerns the Shwartzman Phenomenon by the Injections of Venom of the Moccasin Snake** (*Ancistrodon piscivorus*).—*J. Exp. Med.* **54.** 407-419. 4 tables. [11 refs.]

The Shwartzman phenomenon consists of a skin reaction at the site of a previous intradermal injection of a bacterial filtrate which has been followed after an interval by intravenous injection of a similar filtrate. All normal rabbits

do not react in this way. The authors conceived the idea of testing any possible relationship that might exist between the intensity of a primary purpura produced by intradermal injections of snake venom and the susceptibility of animals to the Shwartzman phenomenon. They found that a large number of rabbits receiving doses of snake venom became refractory if a period of 14 days or more were allowed to elapse before testing for the Shwartzman phenomenon. Similar results were obtained if the rabbits were injected intravenously or intraperitoneally with the snake venom. The refractory state was incomplete in some animals, for rabbits failing to react to intravenous injection of a certain dose of bacterial filtrate readily reacted to a larger dose. This refractory state could not be transferred passively either by means of serum from rabbits treated with venom or by antivenin.

R. LOVELL.

JAMIESON, W. A., & POWELL, H. M. (1931). **Further Studies on the Immunology of the Pneumococcus.**—*Amer. J. Hyg.* **13.** 823-830. 2 tables. [5 refs.]

By growing strains of each of the four types of pneumococci for one to two days in veal infusion broth and passing through a Berkefeld N. filter, the authors obtained skin toxic substances not greatly unlike those that can be obtained from streptococci. Reactions were obtained in rabbits with 0·1 c.c. of filtrate of each type diluted 2-50 times, the toxicity from the type IV strain, which was a freshly isolated one, being distinctly higher than that of any other. Human beings were about 100 times as sensitive as rabbits and the potency of filtrates of types I-IV was respectively 1,500, 3,000, 8,000 and 60,000 skin test doses per c.c.

Efforts to immunise rabbits with filtrate were unsuccessful. In horses, sera were obtained after five to six months' treatment and these not only neutralised toxin of the type injected, but, to some extent, that of each of the others. They did not neutralise filtrates from streptococci, nor did streptococcal sera, or normal horse serum, neutralise pneumococcus filtrates. Some concentration was obtained by salting out with sodium chloride and ammonium sulphate. The use of serum in treatment is discussed.

A. W. STABLEFORTH.

SABIN, A. B., & WALLACE, G. B. (1931). **On the Nature of the Chill-Producing Principle in Antipneumococcus Serum.**—*J. Exp. Med.* **53.** 339-362. 6 tables, 4 charts. [16 refs.]

The authors describe a method of testing the presence or absence of the chill-producing substance in antipneumococcus serum by the intravenous injection of the serum into dogs. The criterion of a positive reaction appears to be a rise of temperature of 1·5° F. or more, occurring within 60 to 75 minutes after injection of the serum and maintained for one hour. Some dogs fail to respond, but suitable ones may be used many times.

It was found that the chill-producing substance may be present not only in immune serum, but also in normal blood or serum. The type of reaction appears to bear no relationship to anaphylaxis or to certain toxic effects of freshly drawn blood which have been studied by FREUND, STARLING and others.

The findings of FELTON that removal of the acid globulin fraction from serum

containing the chill-producing factor tends to remove the latter with it, are confirmed. Furthermore, the acid-globulin fraction appears to contain little antibody, the protective antibody being largely in the alkaline globulin fraction.

R. LOVELL.

BARACH, A. L. (1931). **Factors Involved in the Production of Immunity with Pneumococcus Vaccine. II. Induction of Active Immunity during the Course of Lobar Pneumonia.**—*J. Exp. Med.* **53.** 567-590. 14 tables. [25 refs.]

In an earlier paper, the author dealt with the rate of development of immunity after the injection of pneumococcus vaccine into normal animals. In this paper he deals with the production of specific protective substances in the serum of patients during the course of infection.

The study of the production of immunity during the course of infection seemed desirable because autolysis of pneumococci may take place in the lung during infection, and auto-immunisation may not take place very efficiently. In general, patients were given vaccine or filtrate prepared from mixed or heterologous pneumococci in order to be sure that any protective substances present in the serum were due not to the disease itself, but to the vaccine. Mouse protective experiments were carried out with the patients' serum and with virulent pneumococci of a type corresponding to the vaccine. Specific protective substances appeared four to five days after the intravenous injection of pneumococcal vaccine during the course of lobar or broncho-pneumonia. No conclusions could be drawn from the intradermal cases as the findings were indefinite.

No change in pulse, respiration or temperature occurred as a result of the injection of vaccine or filtrate.

R. LOVELL.

PUBLIC HEALTH.

PAGNINI, U. (1931). Contributo alla tecnica dell'esame batteriologico delle carni. [**A Contribution to the Technique of the Bacteriological Examination of Meat**].—*Clin. Vet. Milano.* **54.** 708-711. [2 refs.]

Gassner's medium is not specific for the recognition of paratyphoid B bacilli and the allied groups, because there are other organisms giving yellow colonies which may be found in the course of a bacteriological examination of meat. The colour reaction depends upon the fact that in an acid medium the tint of water blue becomes intensified, while in an alkaline medium it becomes changed to yellow. This explains why organisms which do not attack lactose produce yellow colonies, while those which attack it and produce more than sufficient acid to neutralise the alkalinity of the agar, produce blue colonies.

With a view to making Gassner's medium more selective, the author suggests the following modification :—

To a litre of ordinary agar (3 per cent.), containing peptone and nutrose, are added :—62·5 c.c. of a two per cent. solution of metachromyellow, 87·5 c.c. of a one per cent. solution of Grübler's 6 B extra waterblue, 50 g. of lactose and 50 g. of saccharose. The mixture is boiled for ten minutes.

A. LESLIE SHEATHER.

CÉSARI, E. (1931). Les ateliers de préparation de viandes et la réglementation sur les établissements insalubres. **[The Regulation of Offensive Trades and its Effect on Meat-preserving Factories].**—*Bull. Acad. vét. de France.* **4.** 254-261.

The French law of 19th December 1917 governs certain dangerous or offensive trades and is intended particularly to protect residents in the neighbourhood of the factories, the latter being divided into three categories according to risk. Falling into the category of minor risk or least objection, and accordingly permitted to be established in populated areas, are the factories in which meat is preserved. Though many of these factories operate on a small scale, the modern tendency to mass-production is being adopted in this trade. Consequently the large factories have to dispose of considerable quantities of by-products (bones, meat trimmings, etc.) which, according to the law, must be removed to fat-rendering plants that legally fall into one of the other categories. The rigidity of the law does not allow a local authority to permit the rendering of fat from by-products at the meat factory where the fats and tallows obtained in a fresh state could be used much more advantageously than when they are recovered in a fertiliser factory.

A plea is made for an amendment of the law, the object of which is defeated by the compulsory accumulation, pending removal, of by-products liable to putrefaction and apt to attract flies and rodents.

D. A. E. C.

POISONS AND POISONING.

NEUMANN-KLEINPAUL, K., & RÜSCHER, W. (1931). Klinische Untersuchungen gedopter Pferde. **[Clinical Examinations of Doped Horses].**—*Arch. wiss. prakt. Tierhlk.* **64.** 226-234.

By their experimental work the authors make a valuable contribution to the knowledge of the doping of racehorses. One thoroughbred and three half-bred horses were dosed with the drugs which are most likely to be used for illicit purposes.

(a) CAFFEIN.—This was administered in three ways :—(1) *per rectum* as a suppository in cocao butter ; (2) subcutaneously, and (3) *per os* mixed with water and given by a stomach tube.

(1) Four horses were each dosed twice by this method at unstated intervals, the doses varying from 1-10 g. The chief effect observed was a marked congestion of the retina of the eye, the optic papilla becoming dark orange red (in five instances). Mydriasis was not observed. In two cases the tail was thrashed or held fast between the thighs and in some cases the pulse was markedly accelerated. In addition the horses were prone to show a change in their temperament, but this factor was only noticeable by the usual attendant or rider of the animal concerned.

(2) From 1-10 g. were given subcutaneously and the effects were similar to those following rectal administration, except that no abnormality occurred in the carriage of the tail.

(3) When administered by stomach tube in the same doses as were employed in the first and second methods, the eyes of all four horses dosed showed marked changes, but these almost disappeared after a gallop. In the case of one horse which had received 5 g. of caffein, the heart beat became very loud and strong. When ridden, two horses showed muscular fatigue.

(b) Caffein-Cocain.—The horses were given subcutaneous injections of from 1-5 g. caffein with 0·1-0·25 g. cocain. Apart from the changes in the eye which were observed with caffein alone, the horses showed no symptoms.

(c) Heroin.—This was administered :—

(1) As a suppository *per rectum*, the doses varying from 0·3-0·7 g. No marked change was observed.

(2) *Per os*, with doses of 0·4-0·7 g. One horse alone showed great salivation 15 minutes after dosing.

(3) Subcutaneously in doses of 0·01-0·07 g.

All four horses showed changes in the eyes similar to those caused by caffein. In addition, they all sweated and salivated and leaned forwards when in motion. The horse which had received the largest dose was very restless and sweated in the stable for some hours after exercise.

(d) Atropin.—The four horses were given 0·05 g., 0·1 g., 0·15 g. and 0·2 g. respectively and their subsequent behaviour is described in detail. The action of the drug may be summarised thus :—the most notable effect is mydriasis with dryness of the oral mucous membrane ; in addition there is intestinal inhibition leading to signs of tympanitic colic ; the pulse is accelerated within 15 minutes of the administration and the blood pressure is raised. The authors consider that atropin doping in any dose above 0·05 g. should be easy to diagnose.

(e) Strychnine.—The four horses were given from 0·0017-0·007 g. subcutaneously. The chief changes noticed were marked acceleration of the pulse and salivation. Also, every horse held its tail out stiffly and the blood pressure rose. The effects wore off about half an hour after administration.

(f) Quinine.—One horse was given 25 g. of quinine hydrochloride by stomach tube. After 20 minutes the pulse rate rose from 54-72 and the respiration rate from 16-120, becoming hyperdyspnœic.

Chemical Diagnosis.

In every experiment the saliva and sweat were tested for the presence of the drugs and in all cases the results were positive.

J. T. E.

Steyn, D. G. (1931). **Recent Investigations into the Toxicity of Known and Unknown Poisonous Plants in the Union of South Africa.**—*17th Rep. Direct. Vet. Ser. & Anim. Indust., Union of S. Africa.* Part 2. pp. 707-727. 1 fig. [14 refs.] Pretoria : Govt. Printer.

A continuation of earlier work [(1929). *15th Rep. supra.* p. 177] on feeding tests with poisonous plants. When the economic importance of the plant justifies it, the larger domesticated animals are used—otherwise laboratory animals serve for test purposes. Taken in botanical arrangement, the results are as follows :—

(1) Aizoaceae.

Mesembrianthemum anatomicum Harv. Common names " kou-goed," " kanna." No symptoms of poisoning developed in rabbits dosed *per os* with 35 g. fresh leaves and flowers, or 160 g. fresh leaves in the pre-flowering stage. Poisoning by other species of *Mesembrianthemum* recorded in the literature of the subject [Pammel, Marloth, Meiring] is discussed.

Psilocaulon sp. (" asbos," " loogas ") is reported by the author as having occasioned death in goats in the Willowmore district. Two rabbits dosed *per os* with 50 g. of the wilted plant died within one hour of dosage ; extremely accelerated

weak pulse and hurried respiration, with *post-mortem* findings of general cyanosis, hyperæmia of liver, lungs, and kidneys, and dark red hæmorrhagic gastric mucous membrane.

The author concludes that the deaths of the goats were due to debility following constant irritation of the gastro-intestinal tract.

Of great general interest is the fact that the same plant brought from Willowmore and grown at Onderstepoort failed to cause death in rabbits even when administered in larger amounts than those in the experiments with the original bush. A variation in toxicity with variation in soil and climate, is suggested.

(2) AMARYLLIDACEAE.

Amaryllis belladonna L. (" Maart lelie," " March lily," Amaryllis, Belladonna lily). The bulbs of this plant were previously recorded as toxic after drying in the sun and storing for three months [cf. (1929). *15th Rep. supra.*] The present investigations were conducted with fresh and half-dried seeds, and it is shown that the plant contains an alkaloid (or alkaloids) very soluble in alcohol, acidulated alcohol and ether, and to a lesser extent in chloroform and water [cf. the *belladonnin* mentioned in PAMMEL's *Manual of Poisonous Plants*].

Hæmanthus amarylloides Jacq. 500 g. of fresh plant (bulbs and leaves) administered to a sheep occasioned death within 24 hours, symptoms of accelerated respiration, pronounced salivation, and accelerated but strong pulse, being shown within one hour of dosing. *Post-mortem* showed general cyanosis with ecchymosis of the conjunctival mucous membranes, subendocardial and subpericardial hæmorrhages, hyperæmia of the lungs, liver, mediastinal and retropharyngeal lymph glands, and acute hæmorrhagic gastro-enteritis. The author could find no previous records of toxicity for this plant.

Hæmanthus concolor Herb. 500 g. fresh bulbs (plant in late flowering and early fruiting stage) administered to a sheep with completely negative results.

Narcissus jonquilla Linn. 50 g. of the bulbs (leaves just appearing) administered *per os* to a rabbit occasioned death within 24 hours with symptoms of asphyxia.

Nerine lucida Herb. Suspected of causing mortality of goats in Griqualand West. Tested on a sheep (200 g. of fresh bulbs *per os*) it occasioned death within 24 hours—respiration slow (10 per minute in the later stages of intoxication), pulse irregular, clonic spasms. *Post-mortem* record given. No previous records of toxicity could be found in the literature at the author's disposal.

(3) ARALIACEAE.

Cussonia spicata Thunb. (" kiepersol," " nooisblom," " sambreel," " cabbage-tree "). Reported as having caused poisoning of cattle, but only 200 g. of leaves forwarded for test. This quantity gave negative results when dosed to a sheep.

(4) ASCLEPIADACEAE.

Asclepias fructicosa L. (" gansies," " melkbos," " tondelbos," " wilde kapok," " fire-sticks," " shrubby milk weed," " wild cotton "). Suspected as poisonous for domesticated animals, but not recorded as toxic in the literature. 40 g. of fresh flowers, stems and leaves, administered to a rabbit *per os* occasioned death within two hours. Symptoms appeared within one hour—weakness of the neck, accelerated pulse, deep costo-abdominal respiration. Within another half hour the animal was unable to raise its head, the heart-beat became irregular and weak, respiration became increasingly laboured and finally failed. *Post-*

mortem showed marked hyperæmia of the lungs, and both ventricles of heart dilated.

Sarcostemma riminale R. Br. ("melktou," "melkbos," "spantou"). 1,100 g. of the fresh vines (without fruit or flowers) administered to a sheep on two successive days. Result negative.

(5) Capparidaceae.

Capparis albitruncata Burch. ("witsam," "witgatboom," "shepherds tree") from Griqualand West. The roots of this tree are used locally in the preparation of "coffee," but this "coffee" is said to cause gastro-intestinal disturbances if taken by anybody not accustomed to it. Tested on rabbits large amounts (220 g. fresh pulpy part of the root) produced no harmful effects.

(6) Compositae.

Aster filifolius. Vent. Suspected to have caused mortality in sheep in the Grahamstown district. 350 g. of the fresh stems, leaves and flowers were given *per os* to a sheep. It was found dead next morning without premonitory symptoms having been noticed. *Post-mortem* showed general cyanosis, marked distension of subcutaneous vessels, hydroperitoneum, hydrothorax, œdema and hyperæmia of the lungs, subendocardial hæmorrhages, *tumor splenis*, hyperæmia of the retro-pharyngeal lymph glands, and other lesions.

A second sheep dosed *per os* with 100 g. of dried flowers, leaves and upper parts of stems of the flowering plant, showed symptoms of distress (arched back, accelerated pulse, hurried respiration, groaning on expiration) after about two hours. Condition became worse after six hours but improved next morning. A further dose of 100 g. again produced transitory symptoms, and a similar dose on the third day reproduced similar effects. After a fourth dose the animal died, with *post-mortem* lesions similar to those described for the preceding sheep but also showing acute gastro-enteritis and the presence of rumenal contents in the trachea and main bronchi.

A third sheep, receiving 300 g. of flowers, leaves and stems, became tympanitic within four hours and died during the following night.

Geigeria pectidea Harv. Tested on a sheep—300 g., followed by 350 g. the same day, 350 g. the day after, and 350 g. on the third day (leaves, stems, flowers and seeds, of air-dried plant in the seeding stage). Death occurred on the third day (48 hours after first dose)—marked salivation, tympanitis, accelerated weak pulse, increased respiration ; finally retching, vomiting, and very stiff gait. *Post-mortem* showed rumen distended with gas, hyperæmia and slight œdema of the lungs, degeneration of myocardium, liver and kidneys ; acute catarrhal duodenitis and jejunitis.

Senecio bupleuroides D.C. Sheep received 1,200 g. of the dry plant (leaves and stems in the post-seeding stage) on four consecutive days. Result negative.

Senecio glutinosus Thunb. Sheep received 1,000 g. wilted and mouldy plant (leaves, stems and flowers) on two successive days. Result negative.

Senecio isatideus D.C. ("Dan's cabbage"). Owing to the importance of *Senecio* sp. in relation to "dunsiekte" of horses [see de Kock, du Toit & Steyn this *Bulletin*. 2. 115.] this plant was studied more exhaustively. A horse was made to consume 2,740 g. of dried *Senecio isatideus* and 810 g. of *Senecio latifolius* in the course of ten months. It developed symptoms closely resembling those of "dunsiekte."

In order to ascertain whether *Senecio isatideus* decreased in toxicity after storage in the dry state, 80 g. dried leaves of flowering plant which had been

kept for 16 months were fed to a sheep. The animal was listless on the following day and died 26 hours after original administration.

Post-mortem examination showed slight general icterus and œdema of the subcutaneous connective tissue, œdema of the lungs, *tumor splenis* with hyperplasia of the malpighian bodies ; extensive regressive changes of the liver, fatty changes of the kidneys, subendocardial and subepicardial hæmorrhages, acute gastro-enteritis, œdema of the leaves of the abomasum and œdema of the perirectal tissues.

A third experiment showed the plant to be poisonous also in the late seeding stage, although the relative degree of toxicity could not be established owing to arrival of the material in partly decomposed state.

Senecio othonnaeflorus D.C. [sometimes called " bietou " although that common name is more generally used for *Dimorphotheca* sp.]. Limited amount sent for testing gave negative results in a rabbit.

Senecio pinnulatus Thunb. 1,000 g. of leaves, stems and flowers administered to a sheep, over two consecutive days. Negative result.

(7) Crassulaceae.

Cotyledon pillansii Schonl. Tested by oral administration to a rabbit and subcutaneous injection of alcoholic extracts into guinea pigs. Results negative.

Cotyledon ventricosa (" nenta," " krimpsiektebossie "). Allied *Cotyledon* sp. known to be the cause of " krimpsiekte " in sheep and goats [cf. Kehoe, D. (1912). *2nd Rep. supra*, Henning. (1926). *11th & 12th Rep. supra.* and Kammerman, (1927). *S. Afric. J. Sci.*].

This species, originating from Namaqualand, proved fatal to the test rabbit (40 g. slightly wilted leaves in the pre-flowering stage) which showed symptoms within one hour after dosage and died, with spasms of the diaphragm, within five hours.

(8) Euphorbiaceae.

Acalypha punctata Meisn. 80 g. of leaves and stems, of the dried plant in the pre-flowering stage, fed to a sheep with negative results.

Eurphorbia helioscopia Linn. (" melkbos "). A sheep was dosed at intervals of two days, with 850 g., 500 g., 400 g., of fresh stems, leaves, flowers, green and ripe fruits. Result negative.

(9) Geraniaceae.

Monsonia ovata Cav. (" keita," " naald bossie," " dysentery herb "). An extract of this plant, sold as a remedy for calf dysentery [putative] was tested for toxicity by administering 100 c.c. to a rabbit *per os*. Result negative. [*Monsonia* sp. are recorded by MacOwen (1877) as used by Hottentots in cases of dysentery and diarrhœa, and are said to contain tannin].

(10) Graminae.

Arundo donax Linn. (" Spanish reed "). Tested on a sheep (600 g.) with negative results.

(11) Iridaceae.

Morœa edulis Ker, var. *longifolia Sweet* (" uintjie "). Tested on a sheep (90 g. dried leaves and flowers) with negative result.

Morœa simulans Bkr., tested on a rabbit (10 g. *per os*) with negative results.

Morœa viscaria Ker (" Teer uintjie "). 250 g. of year-old specimen of dried leaves and flowers fed to a sheep with negative result.

(12) Leguminosae.

Canavalia ensiformis D.C. 22 kg. of ripe beans of this plant fed to a bovine in the course of 20 days produced no harmful effects.

Cassia obovata Collad (" elands-ertjie," " elandspea," " wild senna "). This plant had been alleged to have caused heavy mortality in goats in Griqualand West. Tested on a goat (450 g. slightly wilted leaves, young stems and flowers followed by 300 g. dried leaves next day) and on two rabbits (15 g., 15 g., and 7·5 g., 7·5 g.) gave negative results.

Crotalaria allenii Verdoorn, a species supposed to have caused a form of " styfsiekte " in cattle [the crotalism of Theiler, neither the usual South African " styfsiekte ", i.e. bovine osteomalacia and rickets due to aphosphorus (see this *Bulletin*. **1.** 313), nor the three day " stiff-sickness " of certain countries] was tested on a bovine and on a sheep with negative results. In the case of the bovine the animal refused to eat the plant except in small quantities (100 g.) mixed with large quantities of other food. Supplementing this by forcible administration (stomach tube) the animal actually received 32 kg. during a period of two months.

Crotalaria distans Bth. Tested on a sheep (1,800 g. leaves, stems and flowers, on two consecutive days) with negative result.

Crotalaria dura Wood and Evans. This species has been previously tested at Onderstepoort with positive results [Theiler, A. (1918) " Jaagsiekte " in horses, or *Crotalariosis equorum—7th & 8th Rep. supra.*], and the present experiments aimed at testing the plant after prolonged storage. Material (late seeding stage) preserved for five years, was tested on two horses. The first developed symptoms of " jaagsiekte " after six weeks feeding (along with other food) and was killed *in extremis* on the 74th day of experiment, having ingested 42 kg. of the plant. The second horse ingested approximately 42 kg. in seven weeks, developed the disease and was killed *in extremis* on the 61st day of the experiment. The symptoms and pathology corresponded to the cases described by Theiler [*supra*]. The fact that *Crotalaria dura* can still produce the disease even after prolonged storage is of considerable practical importance in relation to contaminated hay.

Erythrina caffra Thunb. (" kafferboom," " coral-tree "). Flowers tested on a rabbit—result negative.

Neorautanenia coriacea C. A. Sm. Tested on a goat (600 g. *per os*) with negative results.

(13) Liliaceae.

Drimia purpurescens Jacq. (" jukbol "), tested on a sheep [750 g. fresh bulbs in late seeding stage] with negative results.

Ornithoglossum glaucum Salisb. (" Cape slangkop "), tested on a sheep by administering 650 g. of fresh leaves, flowers and unripe seeds. Death occurred within 20 hours. In the latter stages the animal lay recumbent but jumped up excitedly on approach and, in running, displayed imperfect co-ordination of the muscles. *Post-mortem* showed cyanosis, hyperæmia of the lungs, flabby heart with both ventricles distended ; œdema of the retropharyngeal mediastinal and bronchial lymph glands, degenerative changes in the liver, acute duodenitis and jejunitis.

A small specimen of the same species from Pokkraal, Worcester, was administered to a rabbit (65 g. of fresh leaves, flowers and unripe seeds, in two days) with negative results.

The experiment on the sheep seems to be the clearest recorded proof of the toxicity of " Cape slangkop "—a much suspected plant.

(14) Malvaceae.

Sida rhombifolia L. (" Pretoria bossie," " taaiman "), a plant suspected of having caused " dronkgalsiekte " in cattle. Tested on a sheep (200 g. dried leaves, stems and seeds on two consecutive days) it gave negative results.

(15) Ochnaceae.

Ochna Pulchra Hook. A sheep fed daily on the plant (fresh leaves and flowers) died on the sixth day, after having consumed a total of 3,600 g. On the fifth day diarrhœa was acute and tympanites fairly severe—pulse strong and accelerated, respiration abdominal and hurried. *Post-mortem* showed general cyanosis, hyperæmia of the lungs, rumenal contents in bronchi, trachea, larynx, œsophagus, and green fluid oozing from nostrils and mouth ; degeneration and pigmentation of the liver ; degeneration of the myocardium ; acute catarrhal duodenitis and jejunitis.

(16) Polygonaceae.

Rumex nepalensis Spreng, tested on a sheep (300 g. on each of two successive days, of leaves, stem and seed, of plant in late seeding stage) gave negative results.

(17) Ranunculaceae.

Clematis brachiata Thunb. (" traveller's joy," " old man's beard ") tested on a goat 185 g. slightly wilted vines and flowers from Somerset East followed, two days later, by 500 g. of similar material growing at Onderstepoort, gave negative results.

(18) Rubiaceae.

Gardenia thunbergii L Fill. (" wilde katjiepiering," " stompdoorn," " bobbejaangif "). One rabbit received 25 g. dried exocarp and another 25 g. dried endocarp of ripe fruit. Results negative in both cases.

Vangueria pygmæa (" gousiekte bossie "). This plant had been collected in the post-fruiting stage six years earlier. One sheep received 400 g. of the stored dried leaves daily (except Sundays) and died after about five weeks, having consumed 12 kg. in all. The " gousiekte " symptoms of " indolence, with rapid exhaustion when driven," were shown, but the typical histological lesions in the myocardium were not shown at *post-mortem*. There was marked dilatation of both ventricles but no appreciable change in thickness of the ventricular walls.

(19) Solanaceae.

Datura stramonium L (" Pietjie Laporte," " stinkblaar," " thorn-apple "). One rabbit received 100 g. of ripe seeds, a second rabbit received 100 g. of fresh green leaves of a plant in the late seeding stage, and a sheep received 500 g. of the ripe seeds on each of two consecutive days. Results were negative, thus indicating the relative innocuosness of this much suspected plant. [Alkaloidal content of S. African wild *Datura stramonium* generally very low].

Datura tabula L (" blou stinkblaar "). One sheep received 750 g. of fresh leaves of the plant (late flowering stage) and another received 500 g. of ripe seeds, on each of two successive days in both cases. Results negative.

Datura stramonium—Datura tatula Hybrid. Ripe seeds collected from hybrid plants also gave negative results (tested on sheep).

Solanum incanum Linn., tested on a goat gave negative results (1,000 g. fresh ripe fruits on each of two successive days).

Solanum tuberosum Linn., (the common potato). A rabbit received 45 g. of fresh unripe fruits without ill effect.

(20) Zygophyllaceae.

Zygophyllum fœtidum Shr. Fresh leaves, flowers and buds administered to rabbits in 36 g. and 120 g. quantity, gave negative results.

It may be noted that this paper, in which acknowledgments for assistance are made to E. P. Phillips [Principal Botanist, Division of Plant Industry, Pretoria] and to G. de Kock [Subdirector, Onderstepoort] establishes toxicity for the first time, for nine plants upon which information in the past has been vague or lacking.

H. H. GREEN.

Steyn, D. G. (1931). **An Attempt to find Antidotes for Tulp and** *Urginea capitata* **Poisoning.**—*J. S. Afric. Vet. Med. Ass.* **2.** 118-119. 3 tables.

Potassium permanganate and tannic acid were tested for harmfulness on sheep and rabbits before being tried as antidotes to tulp and *Urginia capitata* poisoning.

Potassium permanganate is harmless to sheep in amounts below 10 g. of a 1 per cent. solution *per os* or 0·5 g. intravenously : it is harmless to rabbits in amounts below 1·5 g. of a 1·5 per cent. solution *per os* or 0·002 g. of a 2 per cent. solution intravenously.

Tannic acid is harmless for rabbits in amounts below 5 g. of a 10 per cent. solution *per os* or 0·05 g. of a 1 per cent. solution intravenously. 0·15 g. of a 3 per cent. solution was lethal for rabbits when given intravenously.

Bulbs of tulp and of *Urginia capitata* which were found to be toxic for rabbits were used in the preparation of an extract which was employed in the antidote tests, potassium permanganate and tannic acid both being added (separately) to the plant extract before dosing to the test animals (sheep and rabbits). They were also used in tests of their value as remedies after symptoms of plant poisoning caused by the extract alone had set in.

Tannic acid was found to be valueless either for the neutralisation of the poisons or as an antidote ; potassium permanganate neutralised the poisonous principles in the plant extracts, but it was valueless as an antidote.

J. T. E.

Manske, Richard H. F. (1931). **The Alkaloids of** *Senecio* **species. I. The Necines and Necic Acids from** *S. retrorsus* **and** *S. jacobaea*.—*Canad. J. Res.* **5.** 651-659. [6 refs.]

The author has isolated from *Senecio retrorsus* of South African origin, and from *S. jacobaea*, alkaloids which he names retrorsine and jacobine respectively, the former amounting to approximately 1·3 per cent. and the latter to 0·04 per cent. of the dried plants. *S. aureus* did not yield alkaloid in appreciable proportions. The *Senecio* alkaloids are decomposed by hydrolysis into simpler alkaloids and dibasic acids (or their lactones), which the author proposes to name generically " necines " and " necic acids " ; thus retrorsine gives retronecine and retronecic acid.

G. D. LANDER.

Clawson, A. B. (1931). **A Preliminary Report on the Poisonous Effects of Bitter Rubber Weed (***Actinia odorata***) on Sheep.**—*J. Agric. Res.* **43.** 693-701. 3 tables, 2 text figs. [6 refs.]

Since 1925 *A. odorata* has become a source of trouble from south western Kansas and central Texas across southern New Mexico and southern Arizona to south eastern California and thence southward into Mexico. Although most of

the damage is to sheep, goats and cattle are said to have been poisoned. The weed is locally known as " lemonillo " and " bitterweed," but as the latter name is also given to *Helenium tenuifolium*, it is proposed to designate *A. odorata* as " bitter rubber weed."

The incidence of the damage is believed to be due to heavy grazing of the ranches.

The symptoms in both acute and chronic cases are salivation, nausea, vomiting, depression and weakness with, in acute cases, faster and weaker pulse and higher temperature. The lesions of acute poisoning are those of an irritant, the mucosa of the rumen being congested and the outer surface, especially in the groove between the first and second stomachs and along the anterior edge of the spleen, containing a mass of coagulated serum ; the mucosae of the fourth stomach and duodenum are inflamed and the wall of the fourth stomach is somewhat œdematous. The time elapsing before the onset of symptoms in experimental acute cases varied from about five hours for a dose, estimated as green plant, of 1·3 per cent. of the body weight to about 20 hours with a dose equal to 1 per cent. of body weight. Chronic symptoms appeared after 44 days with daily doses of 0·1 per cent. of the body weight and at correspondingly shorter intervals with larger doses. No chemical examination of the plant is recorded.

G. D. LANDER.

EWART, A. J. (1931). **The Poisonous Action of Ingested Saponins.**—*Bull. No. 50. Commonwealth of Australia Council for Sci. and Indust. Res.* 28 pp. 3 text figs. 12 tables. [2 refs.]

The author draws attention to the wide distribution of saponins in the vegetable kingdom in proportions up to as much as 20 per cent. (Gysophila root). He estimates their toxicity on water snails (*Bulimus*), of shell diameter 1 cm., in 200 c.c. of filtered tap water and shows that saponins increase the toxicity of tannic acid, but reduce that of copper salts. Since saponins are of low but variable diffusibility the dangerous dose *per os* is greater (up to 1,000 times) than that on intravenous injection. It follows too that any circumstance tending to produce irritation or inflammation of the digestive tract favours absorption, and the author observes that, in feeding tests on guinea pigs, doses of calomel or jalapin enhance the toxicity of the saponins.

The Australian horse disease known as " walkabout " is shown to be due to *Atalaya hemiglauca*, which contains as much as 5·8 per cent. of saponin (the New South Wales species containing 1·7 per cent.) which accounts for the fact that the disorder is only prevalent north of the nineteenth parallel.

Horses fed daily with from three to nine and a half pounds of fresh *Atalaya* died within periods varying from 84 to 114 days. One half pound of dry leaf powder per day killed in 58 days. With large amounts the liver cells may show vacuolation, but two to four months is needed to produce noticeable fibrosis in horses and longer in guinea pigs.

Other plants examined comprised *Solidago rigida*, *S. Virgaurea* and *S. canadensis*, *Aster parryi* and *Senecio* spp. and the author suggests that saponins may be the cause of the somewhat obscure stock diseases associated with these plants.

Since small doses of saponins favour absorption, they may cause a more rapid gain in body weight, but the author shows that prolonged dosage to the comparatively resistant guinea pig leads to the reverse effect.

G. D. LANDER.

THERAPEUTICS.

LINDEN, H., & SCHWARTZ, F. K. (1931). Ueber die photodynamische Wirkung von Farbstofflösungen auf Bakterien bei Einwirkung des Phosphoreszenzlichtes. [**On the Photodynamic Action of Dyes on Bacteria in the Presence of Phosphorescent Light**].—*Arch. f. Hyg. u. Bakt.* **106.** 133-146.

Light of various colours was allowed to act on a 20 hour broth culture of *B. coli* in solutions of certain dyes, including fluorescein, eosin and methylene blue. It is concluded that the lethal action is not an effect *sui generis*, but a summation of the action of the dye and of the light. As a result of a comparison of the effect of various combinations of light and dye, it is supposed that the action of the dye depends partly on its primary toxicity and partly on its ability to absorb certain waves which would otherwise pass through or be reflected. No evidence was obtained to suggest the production of a sensitisation comparable to that produced on a photographic plate.

The necessary light energy does not obey the Bunsen-Roscoe law which says that, within wide limits, equal products of intensity and duration of exposure produce equal effects. This is explained partly by supposing that the photodynamic action is a summation phenomenon, and partly by suggesting that there is a phase of division during which bacteria are specially sensitive.

A. W. STABLEFORTH.

LAUNOY, L., & PRIEUR, M. (1931). Actions trypanocides synergiques du 205 Bayer-309 Fourneau et d'un sérum spécifique, dans la trypanosomiase expérimentale à la *Trypanosoma Brucei*, de la souris. [**Synergic Trypanocidal Action of 205 Bayer-309 Fourneau and a Specific Serum, in Experimental *Trypanosoma brucei* Infection of the Mouse**].—*Bull. Soc. Path. exotique.* **24.** 311-327. 10 tables. [1 ref.]

The authors studied the combined action of the chemo-therapeutic agent and a protective serum obtained from naganised animals.

T. brucei infection was transmitted from mice to cats treated with 205 Bayer-309 Fourneau. The course of the trypanosomiasis was thus delayed (32 to 135 days) and at various intervals a series of mice was infected by blood transmission from the cats. It was found that the mice either recovered or survived for longer periods than usual, although subinoculation from the first series of test mice into a second or third series resulted in death in normal time.

The authors then compared the action of the drug plus normal rabbit serum with drug plus serum of rabbits infected with *T. brucei*, both sera being heated to 55° C. for 30 minutes. Normal serum reduced the efficacy of the therapeutic agent but serum of naganised rabbits enhanced it. They conclude :—

(a) That addition of a fraction of the curative dose of 205 Bayer-309 Fourneau to an amount of specific serum, in itself insufficient to protect, results in a sterilisation of infection or a prolongation of the course of the disease.

(b) That a certain minimal quantity of the drug is required however much serum is used.

(c) That the coupled action of serum and drug is not simply the sum of each action alone, but is multiple, so that about a quarter of the usual curative dose is effective.

The authors therefore use the pharmacodynamic term " synergism " to describe the behaviour.

H. H. GREEN.

I. THIROUX, R. (1931). Les dangers de l'abus des arsénobenzènes dans les colonies françaises. [**Dangers of the Misuse of Arsenobenzenes in French Colonies**].—*Bull. Soc. Path. exotique.* **24.** 266-267.

II. LEGER, M. (1931). Les arsénobenzènes aux Colonies : leur emploi raisonné et dûment contrôlé. [**Arsenobenzenes in the French Colonies : their Rational and Properly Controlled Use**].—*Ibid.* 394-406. 2 graphs. [11 refs.]

I. A short note emphasising the danger of uncontrolled use of arsenobenzene derivatives. The author points out that although these compounds are valuable under proper serological control they cannot be left to the discretion of native dispensers or to doctors who possess no means of conducting continuous serological tests. While their use may effect rapid clearance of obvious lesions they may raise the sero-reaction curve in long-standing cases inadequately treated. This is the " provocation " behaviour of VERNES and such cases are frequent in natives who attend clinique irregularly and disappear after primary treatment. Subsequent history may then show an increased incidence of general paralysis and tabes.

In commenting upon the paper LEGER remarked that the arsenobenzenes are double-edged weapons, excellent in clearing up superficial lesions, but dangerous in exciting to activity any organisms they may fail to destroy in deeper sites.

II. In this paper Leger discusses chemo-therapy with the arsenobenzol derivatives (types 606, 914, and others), with reference to louse-transmitted recurrent fever, tick-transmitted recurrent African fever, Castellani's bronchitis, phagodenic ulcers, yaws and syphilis. For all except the last the arsenobenzols are regarded as the most rapid and effective remedies at disposal, although in phagodenic ulcers the spirochætes may be associated with organisms upon which the chemo-therapeutic agent has no effect.

Of treponema diseases of the French colonies, syphilis and yaws cause great ravages. For the latter the arsenobenzol derivatives may be freely used since *Treponema pertenue* is easily reached and readily destroyed, and the spectacular results on gross lesions make excellent medical and social propaganda amongst the black and yellow races.

Syphilis, however, occasions much more concern since *Treponema pallidum* is more resistant and, although the cutaneous and mucous lesions may disappear quite quickly, the deeper sites and nerve lesions may still harbour infection. The organisms seem to organise themselves into centres of resistance very difficult to reach and these, if not destroyed, are provoked to fresh activity as shown by VERNES in 1920.

This provocation behaviour is illustrated by citation of records from the Dutch East Indies where, in Java, two groups of the native population were divided for statistical study. One group was treated with arsenobenzol and the other left untreated. Ten years later the incidence of syphilis in both groups was much the same, but the previously treated group showed a high proportion of ataxia, general paralysis, and dementia. The interpretation subsequently offered by VAN DER LOEFF was " provocation " due to inadequate dosage and

lack of proper serological control of original treatment. Apparently insufficient treatment is worse than no treatment at all.

The author quotes similar instances from China, Algeria, the Argentine, Switzerland and elsewhere, and makes frequent use of the records of VERNES [(1920). *Atlas de Syphilimétrie*, (1926) *Travaux et Publications de l'Institut Prophylactique* and *Archives Institut Prophylactique* No. 1.]. These observations he says, do not mean that the arsenobenzenes should not be used, but only emphasise the need for observing three invariable rules :—

(1) The treatment must be continuous and not intermittent.

(2) The course of the treatment must be controlled by systematic serological tests.

(3) After treatment is ended a prolonged test must be carried out to make certain that infection is gone.

The superficially spectacular results are obtained within the first month, but the patient must be kept under close observation for a further eight months. Monthly blood examinations should show a normal photometric index and lumbar puncture should show a normal cerebro-spinal fluid at the end of the eighth month.

H. H. GREEN.

MORCOS, Z. (1931). **Remarks on Naganol Treatment (Bayer 205) : Trypanosomiasis in Camels.**—*Vet. Rec.* **11.** 162.

Writing from Cairo Veterinary College the author records the treatment of camels affected with trypanosomiasis. Routine treatment comprised two doses of Naganol [Bayer 205, similar to Fourneau 309] administered intravenously at an interval of a week, 4 g. at the first injection and 6 g. at the second. The present note records observations on five camels treated with a single dose of 4 g. dissolved in 40 c.c. sterile saline. The conclusions are :—

1. That an adult camel may be cured of trypanosomiasis by the intravenous injection of a single dose of Naganol.

2. That although film examination and guinea pig inoculation may reveal no trypanosomes in peripheral blood, a formol-gel test may still be positive.

3. That it is inadvisable to treat with Naganol while albuminuria is prominent.

H. H. GREEN.

VAUGEL, M., & BOISSEAU, R. (1931). L'action du Moranyl dans l'arséno-resistance de la trypanosomiase humaine. [**Moranyl in Cases of Arseno-Resistance in Human Trypanosomiasis**].—*Bull. Soc. Path. exotique.* **24.** 374-378. 2 tables. [5 refs.]

A study of the use of Moranyl [Fourneau 309 or Moranyl, and Bayer 205 or Germanin, are products of the naphthylamine-4 : 6 : 8-trisulphonic acid class and are the same] in cases of human trypanosomiasis resistant to treatment with arsenicals. Stabilisation of hyperalbuminosis of the cerebro-spinal fluid about 0·40 is taken as evidence of arsenic resistance and as presaging a relapse. In these cases Moranyl is advised and good results are shown in the tabulated data.

The author regards Tryparsamide as the least satisfactory trypanocide in the earlier stages but the only practicable one in the later stages involving the nervous system [contrast PEARCE, L. this *Bulletin*. **1.** 279.]. For the earlier stages

he uses 270-Fourneau [4-acetylamino -2 hydroxyphenylarsinic acid] with confidence, associated with atoxyl-emetic in cases of vomiting. With doses of 0·35 g. per kg. arseno-resistance is rare, but when it occurs treatment with Moranyl is indicated. When Tryparsamide is used for advanced cases, the author considers that relapses should be treated by returning to Fourneau 270.

H. H. GREEN.

MONIER, H. M. (1931). Association du 710 Fourneau avec la quinine et le stovarsol. [**Association of Fourneau 710 with Quinine and Stovarsol**].—*Bull. Soc. Path. exotique.* **24.** 378-382. [1 ref.]

Having recorded results with Fourneau 710 in cases of malaria [(1931). *Bull. Soc. Path. exotique.* **24.** 97.] the author proceeds to investigate the action of this drug in association with quinine and stovarsol [3-acetylamino-4-hydroxyphenylarsinic acid].

He records human cases of *Plasmodium præcox* and *P. vivax* treated with cachets containing 0·02 g. of Fourneau 710 combined with 0·10 g. quinine sulphate, 0·25 g. stovarsol, or 0·25 g. quinio-stovarsol. He finds that these combinations cause rapid disappearance of the hematozoa from the blood. The daily dose of Fourneau 710 is given as 0·06-0·08 g. The author considers that it is preferable not to prolong continuous treatment for more than a week, but to repeat the treatment, if necessary, after seven days' repose.

H. H. GREEN.

I. WOOD, W. A. (1931). **Experiments on the Treatment of Parasitic Gastritis in Sheep and Lambs.**—*First Rep. Direct. Inst. Anim. Path. Cambridge.* pp. 220-237. 1 table. [14 refs.] Cambridge : W. Heffer & Sons, Ltd. [10s. net.]
(Previously published (1930). *J. Agric. Sci.* **20.** part 2.)

II. SPREHN, C. (1931). Ueber die Magen-Darmtrichostrongylose der Schafe und ihre Bekämpfung. [**Verminous Gastro-Enteritis of Sheep and its Control**].—*Deuts. tierärztl. Wschr.* **39.** 615-616.

I. The author of this paper gives an account of a series of 18 experiments on the effect of various substances on the nematodes of the fourth stomach and intestine of sheep. The experimental sheep harboured the usual mixed infection of trichostrongyles, the species *Ostertagia circumcincta*, *Trichostrongylus extenuatus*, *Hæmonchus contortus* and *Nematodirus filicollis* being present in the largest numbers. The response made to the various treatments was gauged by observations made on the egg counts per grain of fæces, estimated by a modification of the sugar floatation method, and by *post-mortem* examination in a few instances.

The drugs tried and conclusions arrived at are as follows :—copper sulphate and sodium arsenite, action on *H. contortus* only ; copper sulphate alone, action on *H. contortus* only ; a mixture of turpentine, chloroform and linseed oil, no action ; carbon tetrachloride, slight action ; chloramine tablets, no action ; sodium pentasulphide, no action ; proprietary arsenic tablets, some action ; proprietary copper sulphate and arsenic mixture, action on *H. contortus* only ; monsol, no action ; Gow's tobacco powder (containing 33 per cent. of sulphur) mixed daily with the morning feed, marked drop in egg count and improvement in condition ; powdered tobacco, no action ; sublimed sulphur, no action ; tobacco powder and

sulphur, mixed with the morning feed, no action ; copper sulphate and sodium chloride, slight action on *H. contortus* ; B.P. petroleum ether, fall in egg count and improvement in condition ; tetrachlorethylene, fall in egg count.

No indication was obtained that any of these drugs affected any species other than *H. contortus*. Taking into consideration safety and cost of dosing, copper sulphate appears to be the best of the remedies tried and, according to the results obtained, it is as effective alone as it is with the addition of sodium arsenite. [This agrees with the observations of workers in the United States and Australia and with other workers in Great Britain. There appears to be a discrepancy between the results the author is reported to have obtained with Gow's tobacco powder and his concluding remarks that trials of substances mixed with the food were disappointing.]

II. Verminous gastro-enteritis is becoming increasingly important in parts of Germany, and *Ostertagia* spp. and various trichostrongyles other than *Hæmonchus contortus* appear to play an important part in its production.

The treatment of sheep for the expulsion of the small trichostrongyles is well known to be difficult owing, perhaps, to the way in which these minute worms are embedded in the mucus on the wall of the stomach and intestine. The anthelmintic used should therefore be one which will mix with the mucus. The difficulty of introducing the drug direct to the fourth stomach is also an important obstacle and the author here communicates the results of some experiments carried out in connection with this point.

Two sheep each received 100 c.c. of a coloured solution, one by the stomach tube and the other in the form of a drench. Both sheep were killed immediately afterwards and on examination it was found that almost all the material had entered the rumen. Small coloured tablets of 0·2 gm. weight were then tried, ten being given in one dose. On *post-mortem* examination soon after administration it was found that for the most part this material had passed directly to the abomasum as none of the tablets could be found in the rumen or reticulum and only traces in the omasum. An anthelmintic was next similarly prepared in the form of small tablets of 0·2 gm. weight. After a fast of 18 hours, four badly affected sheep were given three of these each. Seven hours later food was allowed but no water. Two hours later, the food was again removed and, after another 14 hours, three more tablets were given ; after a further seven hours, food, but no water, was again allowed. Ordinary feeding was re-commenced on the following day. Within two days all the sheep showed a marked improvement and a *post-mortem* examination of three of them showed that the number of worms had been greatly reduced. The fourth sheep rapidly improved—the watery diarrhœa disappeared, the anæmic mucous membranes took on their normal colour and the weight increased. The number of eggs in the fæces decreased and after 14 days only a small number could be found by flotation examination.

The treatment was afterwards tried on a flock of 800 sheep, many of which were clinically affected. Very good results were obtained in this trial as well as in several other field trials subsequently carried out.

Along with this curative treatment, it is important to apply prophylactic measures based on a knowledge of the life history of the parasites.

E. L. TAYLOR.

UNDERWOOD, P. C., WRIGHT, W. H., & BOZICEVICH, J. (1931). **Critical Experiments with the Intra-cecal Method of Injection for the Treatment**

of Whipworms in Dogs.—*North Amer. Vet.* **12.** No. 10. 41-47. [1 ref.]

Treatment for the removal of whipworms from the cæcum has always been a difficult matter and the methods which are used at present cannot be regarded as satisfactory.

This paper is the report of results obtained in several experiments carried out to ascertain whether the injection of anthelmintics into the cæcum, by means of a catheter introduced *per rectum*, would prove to be of value in treatment for infestation with these worms.

A preliminary test on five dogs indicated that the method was of doubtful value and for the time being the line of investigation was discontinued. The authors' interest in the subject was, however, revived by a publication by STEINBACH (1930) in which a method very similar to that used by them was reported to be highly effective. An additional series of tests was therefore carried out on seven dogs ; the authors' results and conclusions are summarised as follows :—

" Injection, with or without preliminary colonic lavage, of varying doses of tetrachlorethylene, oil of chenopodium or ethylidene chloride, through a flexible rubber catheter passed with moderate pressure for varying distances into the colons of dogs, was 100 per cent. effective for the removal of whipworms from one dog, 3·1 per cent. effective in a second dog and entirely ineffective in 11 other dogs. Some of these animals received more than one treatment.

" There appears to be no definite correlation between the size and weight of the dog and the length of the colon and judgment cannot be relied upon to determine precisely when the colon tube approaches the orifice of the cæcum.

" In view of the apparent difficulty in perfecting a technique for the intracecal injection of anthelmintics, it would appear that this method is not of practical application in the treatment of whipworm infestation in the dog."

E. L. TAYLOR.

I. WRIGHT, A. W., RAFFENSPERGER, H. B., BOZICEVICH, J., UNDERWOOD, P. C., & SCHAFFER, J. M. (1931). **N-Butylidene Chloride. A New Drug for the Treatment of Equine Strongylidosis.**—*J. Agric. Res.* **43.** 287-302. [14 refs.]

II. BOSSLER. (1931). Beitrag zur Behandlung der Sklerostomenseuche der Pferde mit Cejodyl. [**The Treatment of Sclerostomiasis in Horses with Cejodyl**].—*Tierärztl. Rdsch.* **37.** 408.

I. In previous tests on a number of chlorinated alkyl hydrocarbons, a summary of which has already appeared, the authors found n-butylidene chloride to be 100 per cent. effective for the removal of ascarids and 95 per cent. effective for the removal of hookworms from dogs, and, at the same time, well tolerated in doses up to 10 c.c. per kg. of body weight.

Only two of the chlorinated alkyl hydrocarbons have previously been tested on horses, carbon tetrachloride and tetrachlorethylene. Of these two, HALL found carbon tetrachloride to be the better, being particularly effective in removing bots, ascarids and strongyles and partly effective against cylicostomes. These results have received confirmation at the hands of some investigators, but others have found the efficiency to be low and some have recorded symptoms of intoxication and even death.

In view of these results and because of the objection sometimes made to the toxicity of oil of chenopodium, it was decided to carry out trials with n-butylidene chloride.

Eight horses were used as test animals. N-butylidene chloride was given to

four of these in doses varying from 0·207 c.c. to 0·333 c.c. per kg. of body weight, and followed in five hours by 960 c.c. of raw linseed oil. The efficiency obtained for the various species in the four animals was 50 per cent., 94 per cent., 100 per cent. and 100 per cent. respectively for *Strongylus* spp. and 100 per cent. for cylicostomes. In other tests, where the dose of n-butylidene chloride was given in raw linseed oil or where it was followed by aloes or by castor oil-mineral oil mixture, it showed a considerably lower efficiency. Given in doses of 60 c.c. in capsules to three animals, this drug failed to destroy the only *Habronema muscæ* present in one animal, was 55·5 per cent. efficient for this species in a second and 97·2 per cent. efficient for *H. microstoma* in a third animal.

N-butylidene chloride was well tolerated and did not produce any gross pathological changes, and although microscopical examination showed some degenerative alterations in the livers of three animals and in the kidneys of one, this was not considered to be sufficient to discourage the use of the drug as an anthelmintic.

II. During a period of five years, a total of 31 horses belonging to one owner died as a result of infestation with sclerostomes. The usual anthelmintic treatment having failed to control the disease, it was decided to try injections of an arsenical preparation called Cejodyl IV together with anthelmintic treatment by the mouth. The first two trials of this method promised to give good results, a rapid improvement in the condition of the horses being observed. Proper preventive measures were, however, not carried out in the stables and in the field, and the animals became reinfected. The treatment was therefore given a third trial, reinfection being prevented this time as far as possible. Excellent results were obtained ; no deaths occurred, the horses improved in condition and fæcal examinations, which on all previous occasions had revealed the presence of the eggs of the worms, gave negative results.

In addition to its efficiency, the advantages of the remedy lie in its easy application and in its cheapness.

E. L. TAYLOR.

MAXWELL, L. C., & BISCHOFF, F. (1931). **Studies in Cancer Therapy. X. The Effect of Thorium, Cerium, Erbium, Yttrium, Didymium, Praseodymium, Manganese and Lead upon Transplantable Rat Tumours.**—*J. Pharm. & Exp. Therap.* **43.** 61-70. 1 table. [9 refs.]

The approximate lethal dose of soluble salts of thorium, cerium, erbium, yttrium, praseodymium and didymium on intravenous injections into rats was determined.

The effect of intraperitoneal injection of massive doses of soluble salts of the above elements upon tumour growth was examined. No effect on the growth of rat sarcoma 10 was obtained with thorium, cerium, erbium, yttrium, and didymium, but praseodymium nitrate seemed to increase the incidence of liquefaction with this sarcoma but had no effect upon the growth of Hyde rat carcinoma. The latter carcinoma was unaffected either by intraperitoneal injection of manganese acetate or by intravenous injection of massive doses of lead acetate or of colloidal lead of orthophosphate. From the praseodymium results and from the fact that although lead salts are known to affect some neoplasms yet the Hyde rat carcinoma is unaffected, it is concluded that there is definite variation in the reaction of different tumours towards the same substance.

W. R. WOOLDRIDGE.

Schiffman, J. (1931). Die Therapie der Verdauungs-krankheiten des Rindes mit Ruminans Ako. [**The Treatment of Digestive Diseases in Cattle by "Ruminans Ako"**].—*Münch. tierärztl. Wschr.* **82.** 544-545.

"Ruminans ako," made by Dr. Eder, Munich, consists of tartar emetic and salicyl derivatives. The author has used it successfully for some years as a stimulant in the treatment of functional disorder of the bovine fore-stomachs.

J. T. E.

Liebsch, E. (1931). Ueber Gravitol, ein neues synthetisches Uterinum; gleichzeitig ein Beitrag zur Bedeutung der Wehenmittel. [**Concerning "Gravitol," a New Synthetic Uterine Stimulant, together with a Note on the Value of Ecbolics**].—*Berl. tierärztl. Wschr.* **47.** 597-600. [6 refs.]

After quoting certain German authors on the subject of ecbolics in veterinary practice, the author describes two preparations of ergot (*Secale cornutum*) named "Clavipurin" and "Gynergen" and a new synthetic preparation "Gravitol," which is held to possess a similar medicinal action. He used "clavipurin" and "gynergen" in one series of puerperal cases in dogs and cats, and "gravitol," usually supported by hypophysis extract, in another series. He concludes that the two ergot preparations are useful during parturition, but that they are contra-indicated in primary uterine atony and in all forms of dystokia. They are useful in post-puerperal metritis, but are less valuable in chronic metritis.

"Gravitol" was not found to have any definite value in obstetric practice with small animals. The value of hypophysis extract is, however, emphasised.

J. T. E.

Steglich. (1931). Ueber Entozon, ein neues Akridin-Präparat. [**On Entozon, a New Acridine Preparation**].—*Deuts. tierärztl. Wschr.* **39.** 672-673.

Entozon is a new preparation composed of a mixture of rivanol and a nitro-acridine derivative and is made by I. G-Farbenindustrie Aktienges. It is claimed to be as effective as rivanol, but less irritant. It is said to be particularly valuable as a disinfectant of streptococci.

The author gives an account of its use in bovine streptococcal mastitis and post-puerperal metritis, and in a few wound cases in horses.

J. T. E.

PHYSIOLOGY.

Barcroft, J., & Izquierdo, J. J. (1931). **The Effect of Temperature on the Frequency of Heart and Respiration in the Guinea Pig and Cat.**—*J. Physiol.* **71.** 364-372. 1 table, 4 figs. [10 refs].

Fourteen cats and three guinea pigs were used in these experiments. The temperatures were varied by one of three methods:—(a) by placing the animal on an operating table with the well full of water at the required temperature with bottles containing water at that temperature near the animal; (b) by placing the animal in a chamber the temperature of which was varied by changing that of the water contained in a surrounding chamber, or (c) by first clipping the cats and warming them in a warm chamber and then cooling them in a chamber

surrounded by ice. The lowering of temperature was facilitated by wetting the body surface. The animals were either deeply anæsthetised by urethane or chloralose or only lightly anæsthetised by luminal.

With the deeply anæsthetised cats the pulse rate and the respiration rate rose gradually with the temperature between 25° and 41°C. In lightly anæsthetised cats the same was true up to 33° ± 1·5° C. but between this temperature and 38·5° ± 1·5° C. the relation of the pulse rate and of the respiration rate to the temperature was irregular, whilst above 38·5° ± 1·5° C. and below 41° the pulse rate again rose with the temperature whilst the respiration rate rose very rapidly. The irregularities of the pulse exhibited in the middle region seem independent of the vagus as they were not abolished by the administration of atropine. They were usually associated with shivering and the general syndrome of " sham rage " and so may be associated with the sympathetic supply of the heart.

W. R. WOOLDRIDGE.

FORBES, J. C., & IRVING, H. (1931). **Absorption and Retention of Calcium Chloride and Calcium-magnesium-inosite-hexaphosphoric Acid Calcium.** —*J. Pharm. & Exp. Therap.* **43.** 79-83. 2 tables. [1 ref.]

Calcium was fed to rats in the form of calcium chloride or as the naturally occurring calcium compound, phytine, *viz.* calcium-magnesium-inosite-hexaphosphoric acid. These substances were added to diets in approximately equal quantities, adjustments being made in the salt contents to allow for the chloride in the one calcium compound and the phosphorus in the other. The excreta were analysed and the amount of calcium retained was determined. No significant difference in the quantity of calcium absorbed and retained was noted. [The number of experimental animals, *viz.* rats, used was small.]

W. R. WOOLDRIDGE.

SMITH, F., & ROUS, Peyton. (1931). **The Gradient of Vascular Permeability. IV. The Permeability of the Cutaneous Venules and its Functional Significance.**—*J. Exp. Med.* **54.** 499-514. 14 figs. on 4 plates. [21 refs.]

Permeability increases progressively along the capillaries of voluntary muscle. A pronounced gradient is demonstrated in the frog's skin, the small cutaneous venules being even more permeable than the adjoining portion of the capillaries.

This paper deals with the study of the vascular permeability of the mammalian skin by the use of dye injections, and the observation of flaps of skin of albino mice under the binocular dissecting microscope.

The permeability of the venules greatly exceeds that of the capillaries, a mounting gradient of permeability existing along the further portion of the latter. The significance of these facts is discussed in relation to conditions in human skin. In man the cutaneous venules are developed at the expense of the capillaries and the inference seems justified that the venules are differentiated for special purposes.

The relationship of the venular permeability to the functions of the skin in man, which acts as a factor in regulation of the temperature and as a depôt for reserve water, is discussed.

J. R. M. INNES.

ROCHE, J. (1931). Sur la spécificité des phosphatases des mammifères. **[The Specificity of Mammalian Phosphatases].**—*C.R. Soc. Biol. Paris.* **107.** 1144-1145. 1 table. [2 refs.]

Phosphatases were prepared from red blood corpuscles, white blood corpuscles, serum, bone, kidney and intestines, and their ability to decompose a large variety of different organic phosphorus compounds examined. The conditions were arranged so that each enzyme was examined at its optimum pH. The enzymes did not attack all the compounds equally, differences peculiar to one or other enzyme being noted. The enzyme from the red cells seems to differ definitely from those obtained from kidney, intestine, serum and leucocytes and also from bone phosphatase. This latter enzyme seems to be much more active with the hexose phosphates than the others with which it is here grouped and so may be placed in a third class.

W. R. WOOLDRIDGE.

MISCELLANEOUS.

HALL, Maurice C. (1931). **Ethics in Veterinary Medicine.**—*J. Amer. Vet. Med. Ass.* **79.** 13-18.

The writer gives the code of ethics of the American Veterinary Medical Association.

He refers to the disadvantages of a drafted code of ethics as the ideals of individuals and races are not finite, but always changing. The code he says has too much " Verboten " in it and does not seek to imbue the members with a higher idealism of a more positive nature. He suggests that to-day a new code or some other method is required to keep before students and the profession the positive and constructive ideas of honesty, integrity, courtesy, courage, tolerance, kindliness, thoughtfulness and good sportsmanship, as the summation of ethics.

With these virtues and with good taste and judgment, we can make a code of ethics as useless as a policeman in an honest land.

He finishes with the exhortation from Paul : " Whatsoever things are true, whatsoever things are honourable, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report, if there be any virtue, and if there be any praise, think on these things."

W. NAIRN.

I. MINETT, F. C. (1931). **Veterinary Science.**—*Agric. Res. in 1930.* pp. 179-196. [34 refs.] [Royal Agricultural Society of England.] London : John Murray.

II. TAYLOR, E. L. (1931). **Recent Discovery in the Life Histories of some Lungworms of the Pig and Sheep.**—*Ibid.* pp. 196-200.

I. This is a review of certain diseases of which our knowledge has recently been notably advanced and from its nature does not lend itself to abstraction. No attempt will therefore be made to do more than indicate the main subjects considered.

MILK FEVER.—Reference is made to the work of HAYDEN and SHOLL and of FISH, who have shown that the hypothesis brought forward by WIDMARK and CARLENS, ascribing the condition to a hypoglycæmia, is faulty at its essential point because no shortage of blood glucose actually exists. Attention is then given

to the studies of DRYERRE and GRIEG and the confirmatory experiments of others which go to show that a hypocalcæmia is constantly present. A more rational and, so far, successful method of treatment has thus become available. It seems probable that "lambing sickness" and "transit tetany" of lactating mares are due to a similar cause.

"LOUPING ILL" IN SHEEP.—A short description of this disease is given and reference is made to the work of POOL, BROWNLEE and WILSON who demonstrated the presence of an infective agent which they transmitted in series through a large number of sheep and studied in considerable detail, describing the methods of infection and the infectivity of the various body tissues. Reference is also made to the subsequent work of GRIEG, BROWNLEE, WILSON and GORDON who confirmed some of the transmission experiments and demonstrated the infectivity of filtrates, in one instance in a series of 23 sheep. The discovery of ALSTON and GIBSON that the disease can be transmitted to mice is also noted.

"BACILLARY WHITE DIARRHŒA" OF POULTRY.—Attention is given to the work of DOYLE and of RICE regarding natural transmission by infected eggs or contamination of newborn chicks with the excretion of carriers. In a discussion on preventive measures, emphasis is laid on the dangers associated with the increasing use of incubation, the problems of efficient disinfection, and eradication by means of disposal of reactors to the agglutination test.

FOWL TYPHOID.—It is stated that under this name are usually described outbreaks of disease amongst adult birds which are due to an organism somewhat similar to that causing "bacillary white diarrhœa," and which may be transmitted by the same methods. Certain workers consider that the two diseases should be regarded as one. Methods of control by means of hygienic measures and eradication of carriers are discussed.

"FOWL PARALYSIS."—This disease, first observed by MAREK in Austria, has now been recognised in Holland, the United States of America, South Africa and probably South America. In the British Isles it was first recorded by GALLOWAY and more recently severe outbreaks have been described by MCGAUGHEY, DOWNIE and MARGINSON. It is most common and severe in birds 3-8 months' old. The paralysis may be mild, marked by drooping of a wing, or may be sufficient to cause lack of coördination or complete prostration. It is associated with changes in the nerves, chiefly at their points of origin from the spinal cord. There is some evidence to suggest that the condition is transmitted by means of the egg and that adult carriers exist. GALLOWAY has reported transmission by means of intracranial injection of suspensions of affected nerve tissues, lesions which according to various workers are free from the ordinary forms of bacteria.

II. In this paper reference is first made to the so-called "direct" life history of *Ascaris lumbricoides*, and with this is contrasted the life history of those worms in which, because two hosts are required for the completion of one generation, it is called "indirect." The intermediate host, in which the earlier development occurs, is generally an invertebrate such as an insect, snail or earthworm. Turning to the lungworms, attention is given to those of the pig, *Metastrongylus apri*, and *M. salmi* and *Choerostrongylus pudendodectus*. Their course of development is "indirect" in that the larvae deposited with the droppings cannot infect another pig directly, but must pass through an intermediate stage in the earthworm. It is to A. and M. HOBMAIER, whose work has since been amply confirmed, that credit is due for working out this intermediate stage. These authors have also shown that the life history of the lungworms of sheep, *Muellerius capillaris*, and various species of *Protostrongylus*, is "indirect" requiring an intermediate phase of growth in certain species of snails or slugs.

Dictyocaulus filariae, another lungworm of the sheep, has, on the other hand, a " direct " life history, the ingested larvae passing by way of the mesenteric glands and blood stream to the lungs. It also differs from the other lungworms in that it lives in the small air tubes and not in the lung substance. In all cases, even in the so-called " direct " life history, there is an obligatory period outside the host during which larval forms develop.

A. W. STABLEFORTH.

OFFICIAL AND OTHER REPORTS.

MERKENS, J. (1931). Burgerlijke Veeartsenijkundige Dienst. Verslag van het Proefstation voor Keeinveeteelt over het dienstjaar 1930. **[Civil Veterinary Department Report of the Research Station for Small Animal Breeding during the Year 1930]**.—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 363-376. 6 tables.

The report gives an account of the breeding operations carried out with sheep, goats and pigs in Java during the year 1930. In the case of the pigs, certain crosses were bred with imported animals.

A. LESLIE SHEATHER.

GERHARDT, W. T. (1931). Burgerlijke Veeartsenijkundige Dienst. Verslag van het Gouvernements Proefstation voor Pluimveeteelt over 1930. **[Civil Veterinary Department. Report of the Government Poultry Research Station for 1930]**.—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 377-395. 3 tables.

This report deals with the buildings erected at the Research Station and with the breeding operations carried out in Java during the year under review.

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